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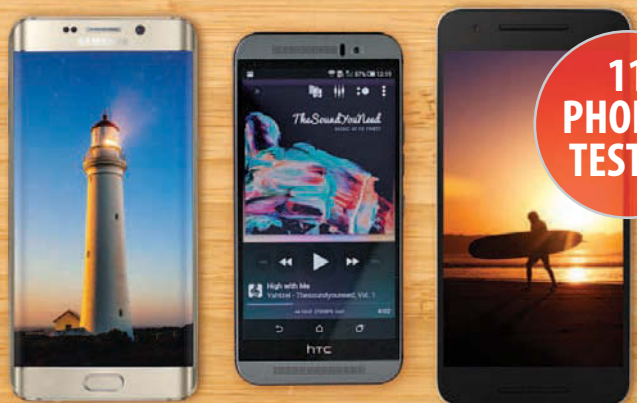
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JIM
MARTIN



Criminal behaviour

Remaining vigilant will help keep your tech safe

It may be 2016 - a time beyond the incredible future envisioned in *Back to the Future Part II* - but despite some of the great tech and life-enhancing gadgets we can now buy, the reality is that we still have to worry about mundane things such as installing antivirus software. In fact, as criminals focus more on scamming people online, everyone needs to be even more vigilant to remain safe and avoid becoming a victim of identity theft, having your data encrypted and held to ransom or another equally despicable crime.

Follow our nine tips on keeping your PC safe (page 92) and you stand a far better chance of doing so, and remember that you should also apply many of the same principles to your tablet and phone too, including installing antivirus on Android devices (page 102).

One of the great new technologies is USB-C, and we're now starting to see laptops, as well as tablets and phones, with the new port. It solves the problem USB has always suffered from: you never know which way to plug it in unless you look at the port and the cable. It is especially frustrating with Micro-USB cables, which never seem to want to attach even when you have the correct orientation.

With USB-C, such as Apple's Lightning connector, you can plug the cable in either way up and it will work. And alongside data transfer, it can deliver enough power to charge. We're a way from being able to use USB-C chargers as interchangeably as traditional USB though, as our tests on page 105 show.

One new gadget with USB C is Google's Pixel C tablet, reviewed on page 24. It's interesting because Google is positioning it as a productivity device so - in theory - you can use it like a Chromebook but also benefit from all the apps available for Android.

We've also tested out the new Lumia 950 XL, a phone that has aspirations of being your only PC by virtue of a Display Dock that lets you use it like a PC. You can find out how we got on with it on page 38. With fewer than 3 percent of smartphone buyers opting for Windows phones, its future is far from certain, though.

Most people choose an Android phone or an iPhone. Our reviews explain all you need to know, but this month we've taken all the popular flagships and gone into significantly more depth with their cameras and audio capabilities. So if you're choosing a phone because you want a great camera, check out our test starting on page 64, but don't miss our review of the DxO One (page 50) if you have an iPhone. Those who care about how their phone sounds will find in-depth analysis of both their speakers and the quality of their headphone outputs on page 78 onwards.

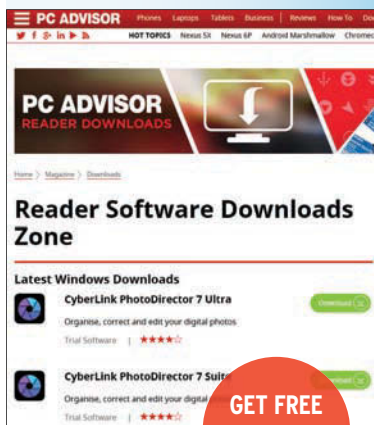
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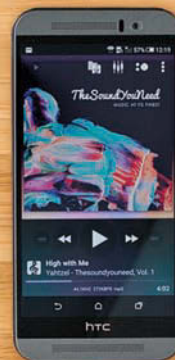


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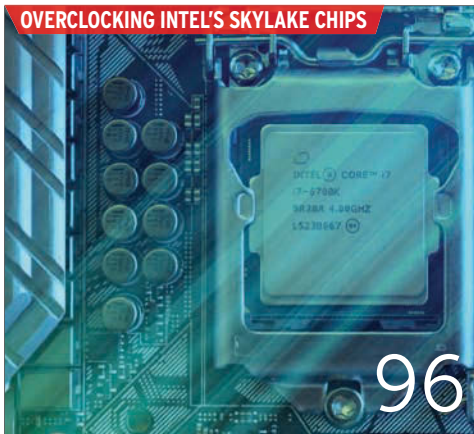
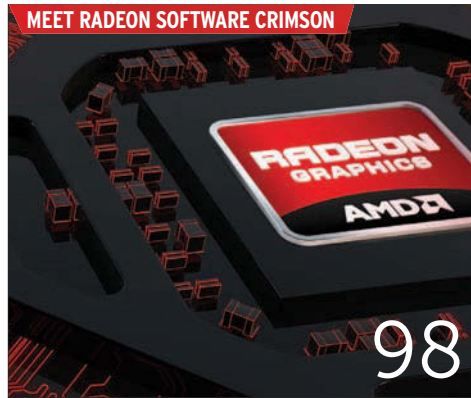
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Microsoft's strong-arm upgrade tactics

Carrots alone didn't lure users into upgrading their OS. Microsoft broke out the sticks, reports [Brad Chacos](#)

Windows 10's deep stash of carrots lured a record-breaking numbers of users to the operating system when it launched. But now that adoption's slowing down, Microsoft is breaking out the sticks in its quest to shift 1 billion users to Windows 10 by July 2018.

Microsoft wielded the latest stick in January, when it declared that buyers of Intel's new Skylake processors have to upgrade to Windows 10 in the next 18 months, or forgo all but the most critical security patches – and those will be available to Windows 7 and 8.1 users only if said patches don't “risk the reliability or compatibility” on non-Skylake systems. Future processors from Intel, AMD and

Qualcomm will only be officially supported by Windows 10, not 7 or 8.

That's a bombshell, and the strike came without warning. Skylake processors have been available for months now, while Microsoft's long-term support for Windows has never been explicitly tied to specific CPU platforms. Making sure new hardware works with old operating systems consumes valuable time and resources, and hardware and software are intertwined now more than ever before, but aggressively forcing users (including businesses) to upgrade to Windows 10 before the end of the operating system's initial stated support cycle ends is unprecedented in the Windows world.

This isn't the first stick Microsoft has brandished in its Windows 10 push. Nor will it be the last.

Get Windows 10 now or now

Even if you aren't running a new Skylake PC, Microsoft has embraced malware-like tactics to trick Windows 7 and 8 users into installing Windows 10. That sounds like hyperbole, but sadly, it isn't.

The root of the problem lies in the 'Get Windows 10' app, which was pushed via Windows Updates to all Windows 7 and 8.1 PCs. The app predates Windows 10 itself, as Microsoft used it to encourage early adopters to preorder the operating system



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to get first dibs in a staggered rollout. But as the months roll on and Windows 10's adoption slows, Microsoft has turned to more annoying – and borderline deceitful – measures with the app. What began as an innocuous invitation floating up from your system tray (see right) has evolved into a near-full screen pop-up prompting you to upgrade.

Worse, the app recently began using aggressive wording similar to the language some employ to trick you into installing malware on your PC. When it pops up, you're given two options: Upgrade now or Start download, upgrade later.

There isn't any 'No thanks, I don't want to download Windows 10' option to click. The only way to refuse Microsoft's offer is to click the X in the upper-right corner of the pop-up to shut it. And some people aren't even seeing the 'Upgrade later' option.

This reeks of malware, but it's not. And it's only going to accelerate later this year, when Microsoft pushes Windows 10 through as a Recommended update in Windows Update.

An offer you can't refuse

Microsoft plans to push through the initial Windows 10 installation as a Recommended update sometime in 2016. That means the operating system will automatically download itself on to any computer that has Windows Update configured to install Recommended updates by default – in other words, the overwhelming majority of consumer PCs in the wild. That's the default setting for new Windows installs, and the one that most tech experts (ourselves included) recommend that everyday people use.

That's just as aggressive as restricting new processors to Windows 10 – perhaps even more so. Users were angered in 2015 when a problem on Microsoft's back end



caused some PCs to install the Windows 10 upgrade automatically, forcing one reader to burn through most of her monthly data plan in mere days. And that was after Microsoft slipped 6GB of initial Windows 10 installation files on to the PCs of Windows 7 and 8 users.

Fortunately, when Microsoft flips the switch and pushes Windows 10 through as a Recommended update, Windows 8.1 PCs won't automatically download updates over a metered connection. But Windows 7 users

is betting that the prompt will use the same words as the app pop-up.

It doesn't have to be like this

There's a lot to love in Windows 10. It's our favorite version of Windows yet, blending the best of Windows 7 and 8, while eradicating Windows 8's worst sins. And new features such as virtual desktops, the Action Centre for notifications, and DirectX 12 are sure to make even enthusiasts and gamers happy.

The only way to refuse Microsoft's offer is to click the X in the upper-right corner of the pop-up to shut it. And some people aren't even seeing the 'Upgrade later' option

will have to turn off automatic downloads for all Recommended updates to avoid downloading multiple gigabytes' worth of operating system. And unless you're scrupulous about manually installing critical updates, disabling Recommended updates will leave your PC vulnerable to some of the nastiest exploits floating around the web.

Microsoft says you'll be able to opt out of the upgrade even after Windows 10's installed to your PC, but the smart money

Not everybody wants to upgrade to Windows 10, though. Some people lament the demise of Windows Media Centre. Others worry about the operating system's deeper hooks into your personal data. Still more hate the idea of forced Windows Updates; and the fear of a free operating system as a service bombarding you with ads, upsells, and subscription services is a very real thing.

Microsoft has a lot riding on Windows 10, and it makes sense that the company wants to spread it as far and wide as possible. But in an era where Macs are a lone bright spot in the PC industry, iOS sales have overtaken Windows sales for the first time ever, and Linux-based Steam Machines are mounting a serious threat to one of the PC's remaining bastions – gaming – Microsoft might want to stop shaking an iron fist at happy Windows 7 and 8 users. By abandoning legacy support for software and hardware and all but shoving the operating system down peoples' throats, Microsoft runs the risk of angering its loyal user base, as well as tossing Windows' hard-earned reputation for consistency in the bin. ☒





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Why SSDs will dominate mobile PC storage by 2018

Trends in SSD pricing and laptop sales are all pointing in the same direction. [Mark Hachman](#) reports



If current pricing trends continue, the conventional laptop hard drive could die by 2018, replaced with fast, slim, and increasingly cheaper SSDs. These transfer data faster and with less latency than hard drives, run silently and consume less power. But they've traditionally been priced several orders of magnitude higher than a hard drive of the same capacity, limiting their use to higher-end PCs.

Quietly, however, that's changing. The flash vendors designing the chips used within SSDs have aggressively introduced technology that continues to lower their cost. Meanwhile, hard-drive vendors have spent the past 60 years whittling pound after pound from the cost of a hard drive, but face slowing price declines that should allow SSDs to catch up.

Hard drives certainly aren't going away - especially in desktop PCs, servers, and in devices such as DVRs. But in notebook PCs? "Let's be honest," argues Bob O'Donnell, principal at TECHanalysis Research. "[Hard

drives] are obviously a technology that will have run its course at some point."

SSD price declines pressure hard drives, alter PCs

Right now, SSDs aren't anywhere close to the same price as a hard drive: on a pounds-per-gigabyte basis, SSDs are six times the price of a comparable hard drive, according to Taiwan's TrendForce. Over time, however, the firm's data predicts that SSD prices will plunge precipitously, putting them on a level with hard drives, whose pricing has remained unchanged. At that point, SSD's other advantages should give it the edge.

Alex Chen, the senior manager in the memory division for TrendForce, writes

in an email that he believes the price per gigabyte for hard drives and SSDs will be "very close by 2018 to 2020."

Extrapolating the current price trend puts the crossing point at four pence per gigabyte. Variances in the forecast model could put that as early as mid-2017, or as late as early 2019.

Separate data compiled by Objective Analysis, which tracks the flash market, is more pessimistic, putting SSD prices at four pence per gigabyte barrier in 2019. (Note: the opposite graph includes forecasts from both TrendForce as well as Objective Analysis; the dotted lines indicate our own extension of that data, using Microsoft Excel's forecasting tool. The key

Right now, SSDs aren't anywhere close to the same price as a hard drive: on a pounds-per-gigabyte basis, SSDs are six times the price of a comparable hard drive



is where the SSD pricing line intersects the hard-drive pricing trend.)

The rapid price declines have their roots in both technical as well as business causes.

Vendors designing flash memory, the building blocks of SSDs, have developed denser multi-layer cell (MLC) flash. Intel and Micron also hope to increase that density further via 3D NAND flash, which promises yield capacities of 10TB inside a 2.5in form factor.

Competition also plays a role. With really only Western Digital and Seagate competing in the hard-drive market, price competition isn't necessarily as cutthroat as in flash. DRAmEXchange believes that Samsung, Toshiba, SK Hynix, Intel and Micron will maintain their aggressive pricing strategy into the first half of 2016.

The lowered SSD prices should produce a cascade effect, not only spurring SSD adoption but also influencing the design of PCs. Data originally compiled by Computerworld from TrendForce reveals that SSDs were used in 21 percent of all notebooks worldwide in 2014. The firm's forecast calls for that number to rise to 42 percent in 2017. Hard drives, meanwhile, are expected to fall from 79 percent penetration in notebooks during 2014 to 59 percent in 2017.

In September 2015, Gartner reported that 277 million 'traditional' desktops and notebooks (typically using hard drives) were sold in 2014, compared to 263 million ultramobile (clamshell notebooks and tablets) devices, which use SSDs. By 2017, the firm says, that ratio will have flipped: 296 million ultramobile devices compared to 226 million traditional computers.

That, in turn, should influence the design of computers themselves. Apple was one of the first manufacturers to throw its

weight behind SSDs with its redesigned 2010 13.3in MacBook Air. Since then, similar Windows-based ultrabooks have become more common. IDC also expects shipments of two-in-one PCs, which dock SSD-powered tablets inside keyboards, to increase 75 percent this year. If SSDs do become prevalent in the notebook market, expect a growing number of thinner, lighter PCs.

On the desktop, the hard drive isn't quite dead yet

Desktop users have an entirely different set of requirements. Analysts argue that some users will indeed adopt SSDs as boot drives or as devices to quickly launch a few key apps. But consumers will still buy traditional hard drives, especially to store and edit digital video and games. External hard drives connected by high-speed USB 3.0 or USB-C

cables will also remain as excellent backups for SSD-powered systems. At some point, it's possible that mainstream desktops will include a single SSD drive and use external drives or the cloud for backup, but it's less certain than for the notebook PC.

"You can't store everything on your [desktop] PC inside flash; it's simply too expensive," storage analyst Tom Coughlin of Coughlin Associates explains.

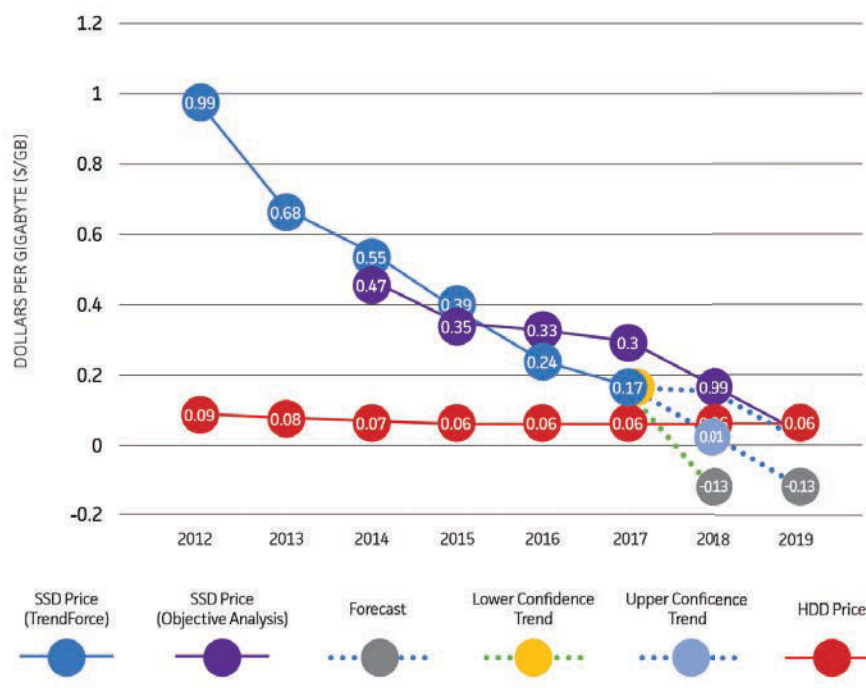
For that reason, we can't write off the hard drive entirely. Some SSD users may also be turned off by reports of slowdowns when transferring large files, or the risk of catastrophic failure. (Fortunately, current-generation SSDs have solved the latter problem.)

What the pricing argument also assumes is that consumers will instinctively recognise the advantages of an SSD, and gravitate toward notebooks that include them. Jim Handy of Objective Analysis thinks that won't always be necessarily true. "I'm thinking of doctors, lawyers, teachers, and firefighters," he says, who buy on considerations like price, the processor speed, and the amount of storage - not the storage technology.

Offer a laptop with a 1TB hard drive for the same price as one with a 256GB SSD, and the average consumer will likely gravitate to the larger drive. "These people are not even aware of the differences between a hard drive and an SSD," Handy adds.

For now, hard-drive makers adhere to the "give 'em more" argument. For about £100, you can currently buy a 3TB internal hard drive, far more than the 300GB worth of SSD storage £100 currently buys.

SSD versus HDD pricing trends



Two different estimates of SSD pricing, mapped against relatively static pricing for hard drives



Technologies such as HAMR optically-assisted hard-drive technology could ship in volume this year, pushing hard-drive capacities to 30TB and disrupting the price-per-gigabyte of hard drives yet again. But traditional hard-drive vendors have also seen the writing on the wall:

For those of you who have used a laptop equipped with a hard drive, however, will already know how great SSDs are. Rebooting a PC used to take enough time to get up and fetch a cup of coffee; today, it's barely enough time to pull out your phone and check your email.

your buying decision. But if you want to add extra storage capacity, you have hundreds of external options to choose from, SD cards to add, or cloud storage such as Microsoft's OneDrive. You don't need to buy a laptop with a 4TB hard drive inside, because you can always add that extra storage later. What you've got is good enough.

But increasing your laptop's boot speed? Loading a game in a matter of seconds? That kind of convenience comes from only one component: an SSD. And once you've experienced it, you don't want to go back. Lower prices may eventually kill the notebook hard drive in favour of the SSD. And what a great day that will be. If current pricing trends continue, the conventional notebook hard drive could die by 2018, replaced with fast, slim, and increasingly cheaper SSDs. ☒

Increasing your laptop's boot speed? That kind of convenience comes from only one component: an SSD. And once you've experienced it, you don't want to go back

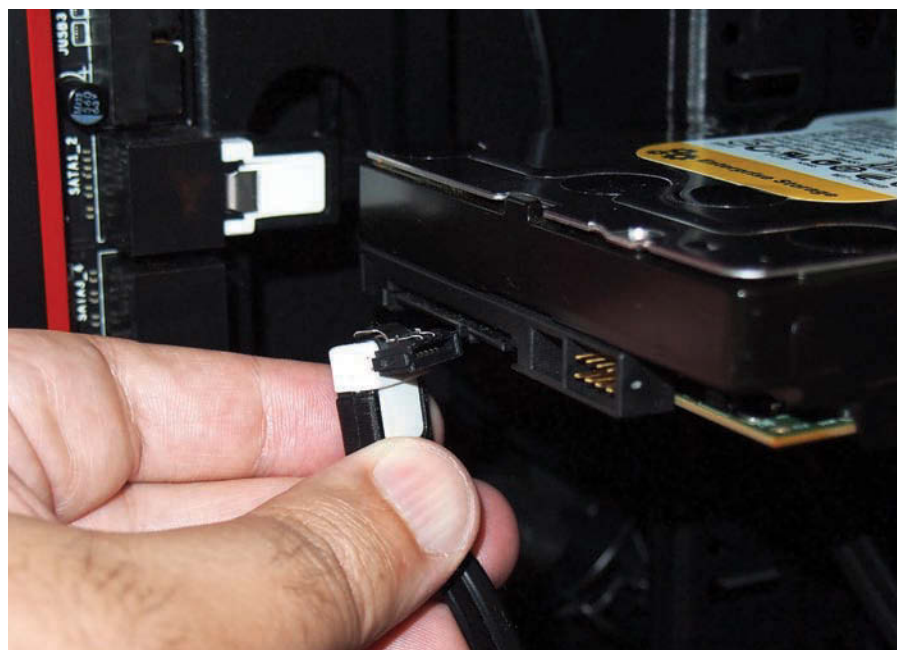
Seagate bought LSI's flash business for \$450 million in 2014, and Western Digital has bought SSD makers STEC and Virident.

The 'good-enough' argument

Extrapolating forecasts is always risky, and the data compiled by TrendForce and Objective Analysis differs somewhat. But the downward trend is clear - unless the hard-drive industry can cut its manufacturing costs, it appears that eventually SSDs will become more cost-effective than traditional hard drives in the notebook space. At that point, then, we should expect those hard drives to disappear.

There will be exceptions, of course. It's not hard to believe that gaming notebooks will offer roomy hard drives as an option. Some movie services, such as Microsoft, allow you to download the film to your notebook's hard drive, and business travellers might cache a bunch of movies for a transatlantic flight. Still, these will probably prove to be the exception, rather than the rule.

But there's also the 'good-enough' argument. You simply can't buy a peripheral that can enhance the performance of your laptop's CPU, or add more memory, so both of those components should weigh heavily in



Traditional hard drives aren't expected to vanish from desktops anytime soon

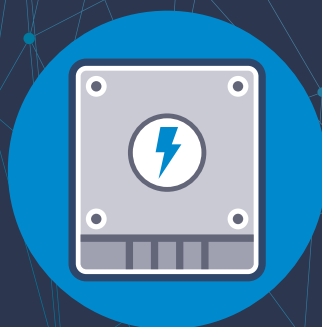


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Chromebooks are siphoning market share from Windows PCs

Chrome PC shipments in 2015 set to grow compared to 2014, writes [Agam Shah](#)

Shipments of PCs with Google's Chrome OS are growing at the expense of Windows laptops and desktops, as the PC market suffers its biggest slump since 2008. Especially popular are Chromebooks, which are basic Chrome OS notebooks for web computing. They have proved particularly attractive to students, educational institutions and budget buyers.

Worldwide Chrome PC shipments in 2015 are expected to surpass those in 2014, according to market analyst IDC. They accounted for 2.8 percent of all PCs shipped worldwide through the first three quarters of 2015. For all of 2014, Chrome PCs accounted for 1.9 percent of all computers shipped.

According to Jay Chou, research manager at IDC, Chrome PC shipments in 2015 will outpace those in 2014, and the growth trend will continue in 2016.

About 5.7 million Chrome PCs shipped in the first three quarters of 2015, a figure that's only slightly lower than the 5.86 million shipped for the whole of 2014. Total PC shipments worldwide were 276.21 million in 2015, declining by 10.4 percent from 2014, according to IDC. A breakdown for how many of those shipments were for Chromebooks in the final quarter is not yet available.

Expectations weren't high when the first Chromebooks were launched in 2011. Shipments of the laptops started growing at a steady pace when the second-generation of Chromebooks started shipping in late 2013. All top PC makers, with the exception of Apple, now offer Chrome laptops and desktops. Google has promoted them as a low-cost replacement to Windows PCs, especially with more people using web applications. The search giant also promised

Microsoft is hoping Windows 10 will help it stem the growth of Chromebooks



regular operating system updates and the ability to use applications offline when the computer isn't connected to the internet.

Microsoft took on the Chromebook challenge by encouraging PC makers to develop low-cost laptops with the free Windows 8.1 with Bing OS. But that effort ended when it released Windows 10, Chou said. PC prices are also rising, while Chromebooks remain inexpensive because

they use basic hardware. Windows 10 has advantages over the Chrome OS. Windows can be used for a wide range of graphics, productivity and CAD/CAM applications, and it supports more hardware. However, Google's operating system is much leaner.

The future of Chrome OS is clouded, though. Late in 2015, *The Wall Street Journal* reported that Google planned to merge the operating system into Android. ☒



Google will be asked to explain 'cosy' UK tax deal to lawmakers

Google has agreed to pay £130 million in back taxes, but critics say it owes millions more.
Peter Sayer reports



Politicians want to know why Google is paying so little in back taxes, and will demand that the search giant come in for a talk.

The company and Her Majesty's Revenue and Customs (HMRC) will be summoned by the Public Accounts Committee to justify a settlement in which Google UK will pay £130 million in back taxes. Committee chairwoman Meg Hillier recently tweeted, "Bet individual taxpayers wouldn't get off as lightly as Google on back tax. Cosy deal. Will call HMRC and Google to @CommonsPAC to explain."

The settlement followed an investigation of Google's accounts dating back to 2005, and opened by HMRC in 2010. That investigation prompted the company to set aside an additional £24m provision for back taxes in its 2012 accounts.

While Google claimed to be paying far above the standard rate of corporation tax in its most recent accounts, it has been accused of manipulating its results to show an artificially low revenue and taxable profit in the UK. The discrepancy can be seen in the company's results for 2013, the last year that Google UK filed accounts with Companies House. For that year, Google UK reported that its 1,835 staff generated revenue of £642.4m. The company set aside £21.6m for tax and reported a net profit of £49.2m, for a profit margin of 7.7 percent.

Looking purely at the profit declared, that equates to a generous tax rate of 30.5

percent. That's higher than the official UK corporation tax rate of 23 percent for that year, and almost double the 15.7 percent effective tax rate the parent company reported globally. Yet Google UK's parent company in the US said that \$5.6 billion of its global revenue of \$59.8bn that year came from the UK, almost five times what it reported to British authorities.

Google UK is able to legally report so little UK revenue because, according to its filings, it exists to provide marketing services to Google Ireland, and research and development services to its US parent.

Google UK's parent company in the US said that \$5.6 billion of its global revenue of \$59.8bn that year came from the UK, almost five times what it reported to British authorities


Revenue from the advertising it markets in the UK is billed through its Irish subsidiary, which pays it a fee for its services.

Had Google channelled all the revenue from UK advertising through its British subsidiary, then given the same profitability and effective tax rate as it saw globally, it might have expected a tax bill nearer £129m, rather than the £21.6m it paid. That's almost as much tax in one year as the company has now agreed to pay in back taxes for a 10-year period.

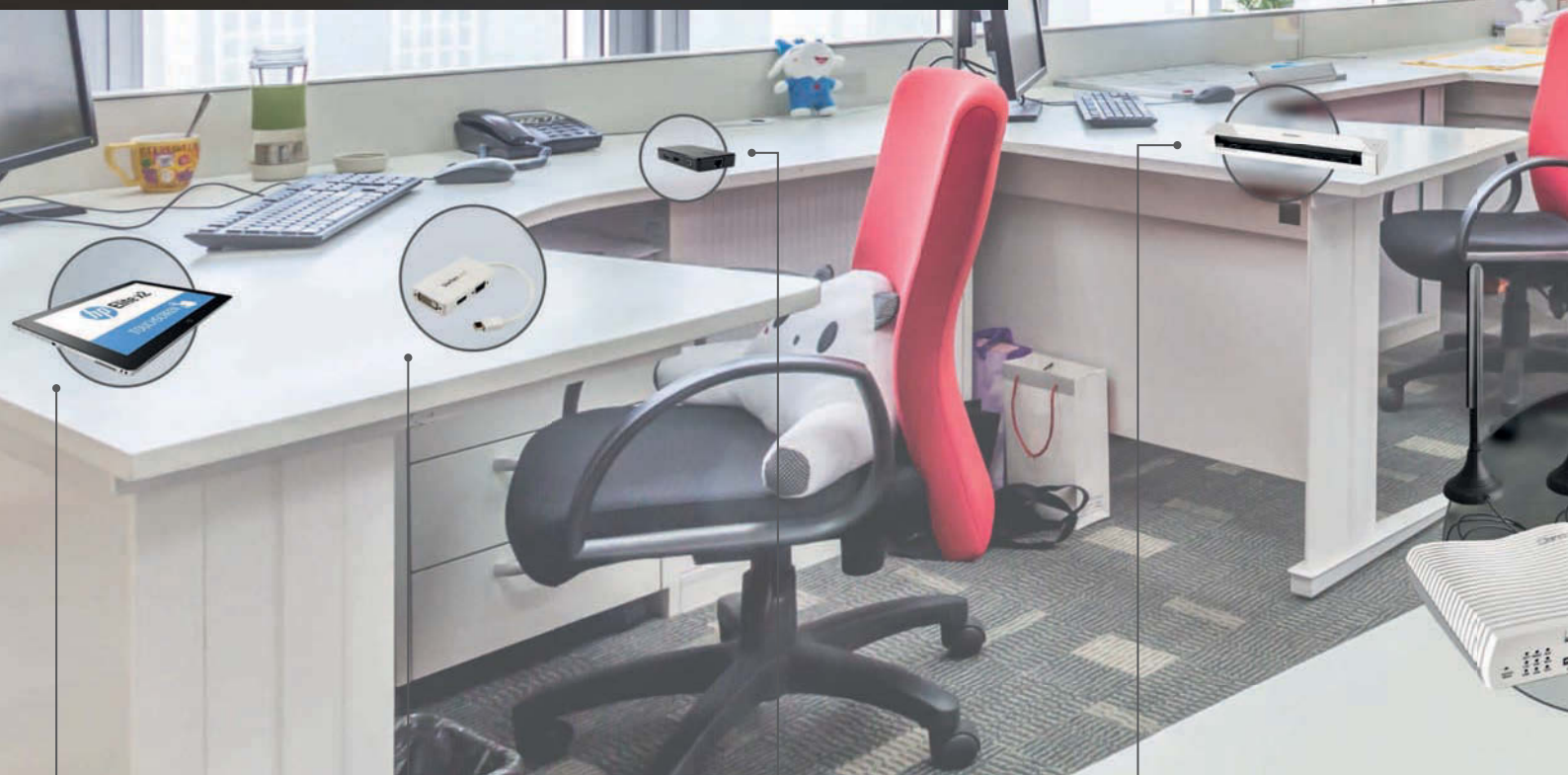
John Christensen, executive director of the Tax Justice Network, thinks the £130m payment is nowhere near enough. "We're seeing an effective tax rate for the current deal for 2005 to 2014 of around 3 percent. We think it should be far higher," he argued, pointing out that the nominal tax rate for most of that period was well in excess of 20 percent. "There should be some transparency about how they arrived at this settlement," added Christensen.

While he welcomed Hillier's intention to call Google and HMRC before the Public Accounts Committee, he wants a more

thorough investigation from the National Audit Office, which scrutinises public spending and tax collection.

It will be a while before any details of Google's tax settlement filter through into its public filings. On 16 September 2015, the company filed notice that it had extended its 2014 fiscal year to end on 30 June 2015. Those figures are still to come, while the settlement may appear in the filing for its 2015 fiscal year ending 30 June 2016, which need not be filed until 2017. 

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International

CES®

CES 2016 is the biggest technology show on the calendar and here we've rounded up the best products we saw in Las Vegas this year

Razer Blade Stealth and Core



Ultrabook and GPU housing

The Blade Stealth is Razer's most compact gaming laptop yet, with a 12.5in screen that is available in either QHD or 4K. It also comes with 8GB of RAM, an Intel Skylake Core i7-6500U chip and up to 512GB SSD storage. The Ultrabook optionally plugs into the Core via Thunderbolt 3 (USB-C), which houses the desktop GPU of your choice.

Blade Stealth: from \$999 (UK price TBC)

Razer Core: £TBC

razerzone.com



Razer Blade Stealth



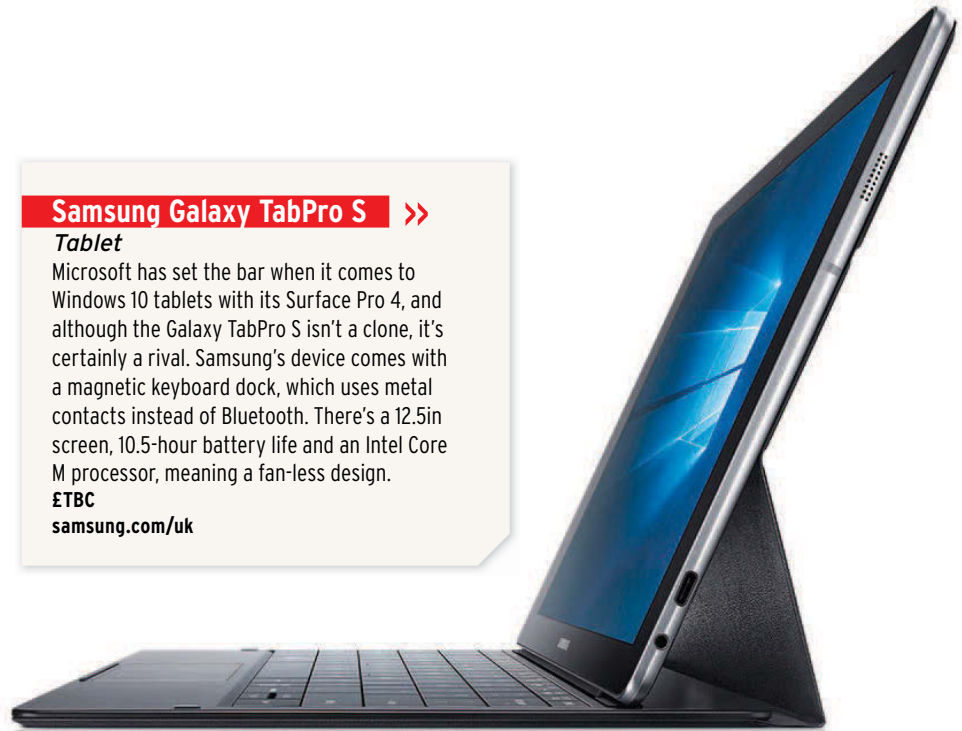
Razer Core

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CHRIS
MARTIN**Samsung Galaxy TabPro S >>****Tablet**

Microsoft has set the bar when it comes to Windows 10 tablets with its Surface Pro 4, and although the Galaxy TabPro S isn't a clone, it's certainly a rival. Samsung's device comes with a magnetic keyboard dock, which uses metal contacts instead of Bluetooth. There's a 12.5in screen, 10.5-hour battery life and an Intel Core M processor, meaning a fan-less design.

£TBCsamsung.com/uk**Casio WSD-F10 >****Smartwatch**

Well-known watch maker Casio has entered the smartwatch market with the oddly-named WSD-F10. It has a circular screen, runs Android Wear, while its robust design is aimed at those who love the outdoors. Although the Casio doesn't have GPS, it is waterproof to 50m and can measure atmospheric pressure.

\$500 (UK price TBC)casio.co.uk

THE RESULTS SPEAK FOR THEMSELVES

LG gram 15 >>

Laptop

Looking for a Windows alternative to the latest MacBook? Well say hello to the gram 15, LG's latest offering. It's gold like Apple's stunner, but is the world's lightest 15in laptop at just 980g thanks to its magnesium alloy body. Inside is a Core i5 or i7 processor and up to 512GB SSD.

£TBC
lg.com/uk



<< Withings Go Activity tracker

The Go is Withings' smallest and cheapest activity tracker to date. It's not much bigger than a two-pound coin and can be worn in different ways, such as a watch or as a clip. The always-on e-ink screen provides basic information on your progress, works as a clock and means battery life is a healthy eight months.

£49 inc VAT
withings.com/uk/en

Acer Liquid Jade Primo >>

Smartphone

Phones were few and far between at CES, but Acer was back on the Windows smartphone bandwagon with its Jade Primo. Unlike a lot of Acer phones we've seen, this model has some serious specs, including a 5.5in SuperAMOLED screen, 21Mp camera and a Snapdragon 808 processor. It comes with Windows 10 Mobile.

€569
acer.co.uk





Huawei MediaPad M2

Tablet

The number of new tablets coming out has dropped a lot recently, but Huawei has something new to catch your eye. Its 10.1in Android offering has a premium metal and glass design, with a Kirin 930 octa-core processor hidden beneath. It also has four speakers placed on the edges for above average sound performance.

From \$349 (UK price TBC)
huaweidevice.co.uk

Dell UltraSharp InfinityEdge >>

Monitor

If you've been dreaming of having the screen of Dell's XPS 15 9550 laptop (see page 28) in monitor form, then we have great news. The InfinityEdge monitors come with tiny 5.3- or 7.3mm borders respectively, 99 percent sRGB accuracy and four USB 3.0 ports. You can get a 23.8in model with a Full HD resolution or jump to 27in with QHD (2560x1440).

23in from \$349 (UK price TBC)

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dell.co.uk



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Parrot Disco >>**Drone**

The most interesting drone at CES 2016 was the Disco from Parrot. It's the first fixed-wing drone and is driven by a single propeller at the rear instead of using four like most on the market. That's not all as it features automatic take-off and landing. Simply throw it in the air and it will do the rest.

£TBC**parrot.com/uk****<< HP EliteBook Folio****Laptop**

At 12.4mm, the EliteBook Folio is touted as the world's thinnest and lightest business class notebook. Similar to the LG gram 15 (page 20), it weighs less than a kilogram and offers a battery life up to 10 hours. It also offers USB-C and has a 12.5in 4K display that can flip 180 degrees.

From \$999 (UK price TBC)**hp.com/uk****Fitbit Blaze >>****Activity tracker**

Although it looks like a smartwatch, Fitbit maintains that the new Blaze is a tracker like its other products. However, it can connect to your phone over Bluetooth to provide notifications for things such as calls and text messages. Either way, the Blaze is customisable with a range of straps and features a 'PurePulse' heart-rate sensor, but no built-in GPS.

£159 inc VAT**fitbit.com/uk**

**<< Lenovo ThinkPad X1****Tablet**

Lenovo going all suit and tie with its tablet doesn't sound exciting, but the ThinkPad X1 Tablet offers a modular design. You can bump the battery life to 15 hours, clip on a pico projector and HDMI port, or add an Intel RealSense camera. It's a rival to the Surface with a keyboard dock, Core-M processor, up to 1TB of storage and a 2560x1440 IPS touchscreen.

From \$899 (UK price TBC)**Modules from \$149 (UK price TBC)****lenovo.com/uk/en****Sony Bravia XD93 >>****TV**

TVs are always a large part of CES, and HDR (High Dynamic Range) was the big thing for this year. The XD93 range is the first to feature Sony's Slim Backlight Drive, a new grid-array backlighting system to create brighter peak highlights and deeper blacks with up to three times the contrast range of conventional TVs. Sony also wants to tempt you with the virtually bezel-free design, X1 processor and Android TV.

ETBC**sony.co.uk**

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Specifications

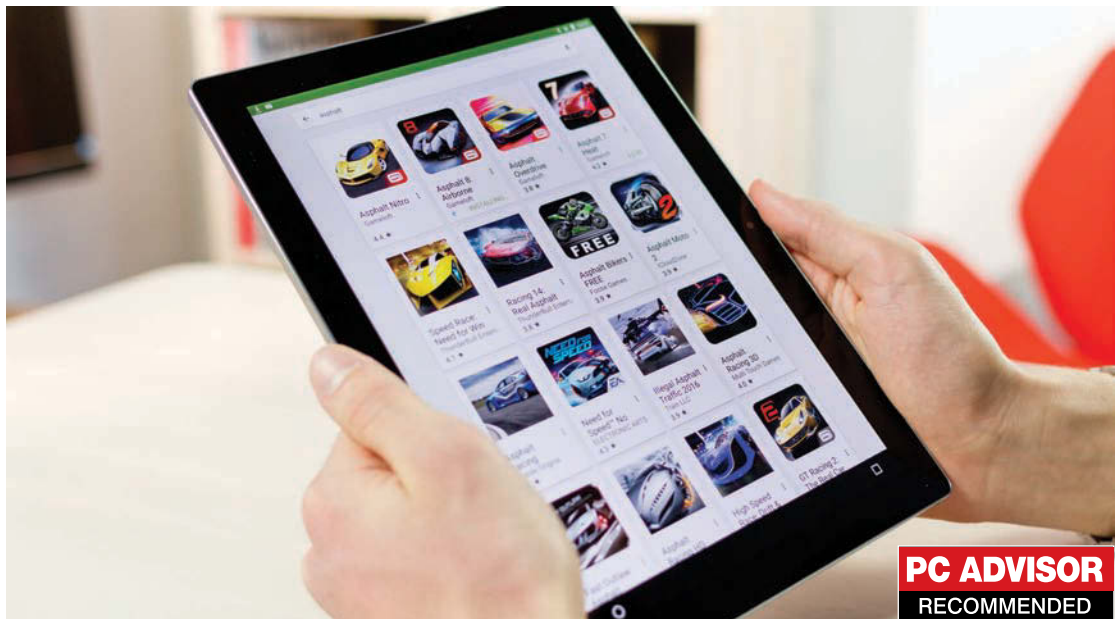
10.2in touchscreen display, 2560x1800, 308ppi); Android 6.0 Marshmallow tablet; 1.9GHz nVidia Tegra X1 processor with Maxwell GPU; 3GB LPDDR4 RAM; 32GB or 64GB storage; 802.11a/b/g/n/ac dual-band (2.4GHz, 5GHz) Wi-Fi with 2x2 MIMO; Bluetooth 4.1 + HS; USB Type-C, 3.5 mm audio output; Gyroscope, Accelerometer, Ambient light sensor, Proximity Sensor, Compass, Hall Effect Sensor; 242x179x7mm; 517g (keyboard 399g)

Build: ★★★★★
Features: ★★★★★
Performance: ★★★★★
Value: ★★★★★



TABLET

Google Pixel C



PC ADVISOR
RECOMMENDED

Google announced the Pixel C along with the Nexus 5X and 6P, but rather than partnering with LG, Huawei or one of its previous tablet partners, the Pixel C is designed entirely by Google, and manufactured by an unknown company in China. It's an Android tablet - not a Chromebook with Chrome OS - but you can buy an optional keyboard to turn it into a device that everyone from Apple to Lenovo is falling over themselves to produce: the two-in-one convertible.

Price

Many people will buy the Pixel C because they want a top-end Android tablet instead of an iPad. And they'll pay the same price: the base model costs £399, but instead of the Air 2's paltry 16GB of storage, the Pixel C has 32GB.

If you want more, then the 64GB model costs £479 - the same as the 64GB iPad Air 2. There's no cellular model, so you'll be using Wi-Fi for an internet connection. The keyboard is surprisingly expensive at £119, given that it doesn't have backlit keys or any extras beyond a built-in battery and Bluetooth.

Design

Apart from Samsung's Tab S tablets, it's hard to think of any other Android tablets that look and feel as well made as the Pixel C. In terms of build quality it's very much a rival to the iPad, but its design is more first-generation iPad

than Air 2. Its square edges make it look thicker than it really is (7mm), but it's relatively heavy at 517g. The iPad weighs 437g.

There are stereo speakers, one in each side of the tablet when held in landscape, which is the 'default' orientation, rather than an iPad's portrait design.

The front camera is mounted centrally in the top bezel, and a USB C port resides at the bottom of the left-hand edge. The volume rocker sits at the top of the same edge and at the opposite side is a headphone jack. The power button sits top left and the four dots in the middle are microphones that let you use 'Ok Google' from the other side of the room.

At 10.2in the screen is half-an-inch bigger than the iPad's, but it's smaller than the Surface 3 (10.8in), and a couple of inches smaller than the iPad Pro and Surface Pro.

But the competition will depend on your primary reason for wanting a Pixel C. If you're after a 10in Android tablet, then Galaxy Tab S2 9.7 and possibly Google Nexus 9 will be on your shortlist. If you just want a 10in tablet, you might also consider the iPad Air 2 or the cheaper Amazon Fire HD 10. But if you want a two-in-one, then it's the Surface 3, 3 Pro, 4 Pro, iPad Pro and numerous other Windows convertibles from Dell, Lenovo, Asus, and others.

You can save money and buy a Windows 10 tablet that comes with

a keyboard. For instance, Asus' Transformer T100HA costs just £269 and manages to bundle a keyboard in the deal.

Keyboard

It's no surprise that the keyboard is optional: not everyone wants or needs one. And Google has thought long and hard about how to make the best possible typing experience.

You attach the tablet by laying it flat on the magnetic hinge, then raise it up to your desired angle so it looks like a laptop. The magnets are amazingly strong and the keyboard will stay firmly attached if you grab the tablet's top edge and pick it up.

Because of this attraction, it's difficult to separate the two: you have to slide the tablet off sideways. You can then flip it over and place it face-down on the keyboard so it's like a closed laptop. Cleverly, the keyboard's battery will charge wirelessly in this position, so you never have to think about it.

When you want to use the Pixel C as a tablet, the keyboard attaches to the back, or you can detach it completely, of course.

There are four plastic feet, but these - and the aluminium panel they protect - are slippery, so it's not great to use on your lap. There's no flex, but it will tend to slide off if your legs aren't perfectly level.

It's also worth pointing out that, like touchscreen laptops, the screen wobbles around a bit when

typing and bounces when you tap the screen. This isn't really an issue with the Microsoft and Apple tablets as the former have sturdy kickstands, and the iPad Pro has a fixed angle (which introduces its own problems and limitations).

Google hasn't tried to make the world's thinnest keyboard and has instead ensured that keys have decent travel and feedback. Despite the cramped space available and a few missing keys (the ones you never use) it's pleasant to type on - at a desk - and unlike Apple's keyboard it's a UK layout, with the £ and @ symbols in their 'right' places.

It's heavy at 399g, and brings the total weight to almost a kilo.

Android

Google has stressed that having complete control over hardware and software means everything is tightly integrated but it's clearly still early days for the Android two-in-one machine. Marshmallow is a brilliant mobile OS, but it's not yet ready to replace your Windows laptop.

To be fair, Google doesn't claim that it will, only that it's a "whole new approach to the tablet experience". It offers all the benefits of a keyboard, along with the portability of a tablet. So if you need a keyboard for writing lots of emails or long documents, there's certainly an advantage of opting for the Pixel C over other Android tablets. Google has tweaked and optimised its productivity apps, and they do work well with the keyboard attached.

But if you're a Chromebook user, you'll miss some features such as a USB port and an SD (or microSD) card slot. The only way to transfer files is via the cloud - or by hooking the Pixel C up to a laptop. There's also no support for Flash in Chrome (just like any other current Android tablet), so you'll come unstuck if you need to use a website that relies on Flash.

In general, though, it is a blessing that Google didn't opt for Chrome OS for the Pixel C. At least with Android you get the Play store, and with it hundreds of thousands of apps and games to install. Whether it's Skype or iPlayer, Asphalt 8 or Crossy Road, you won't be stuck with just a web browser as you are on a Chromebook.

However, it's a sad fact that there still aren't all that many

Android apps optimised to run on a big, high resolution screen. Using Google's own apps is fine, but Android tablets still feel as if they're a second-class citizen compared to the iPad, which has a much wider range of optimised apps.

Marshmallow is for the moment a strictly one-app-at-a-time operating system. Rumour has it that it will be updated to allow two apps to run on screen at once like an iPad Pro (or Samsung tablet which has allowed split screen for a while now). But today, you'll have to live with Alt-tabbing between apps, which all run full-screen. It's nice to be able to do this, but it's not enough of a consolation if you were hoping for a laptop-style experience.

There's no trackpad because of the touchscreen, but if you're a stylus fan, know that the Pixel C doesn't have one. There's no official pen, pencil or any other stick that will let you draw, sketch or take notes.

Display

One of the best features of the Pixel C is its screen. Put simply, it's fantastic. It has an unusual resolution of 2560x1800, which is an aspect ratio of 1.42 - the same as A4 paper (or any other A-series paper). That's good in our book. Some people will moan that it's not 16:9, but unless you're going to mainly watch TV shows, it's not going to be a disadvantage.

It uses the expensive LTPS type of IPS screen (Low Temperature PolySilicon). So as well as great brightness, contrast and colour accuracy, it's also power efficient so you can go longer between charges.

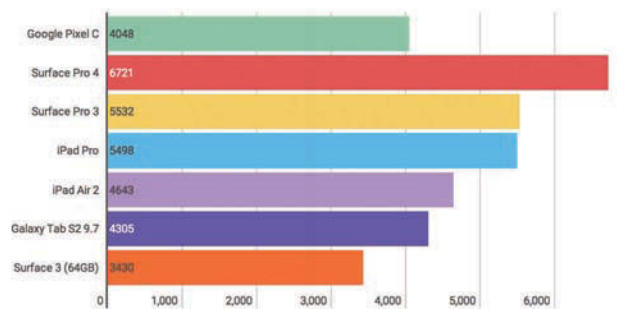
That high brightness, which we measured at 468cd/m² - just a little shy of the 500 that Google claims - means you can much more easily see what's on the screen outdoors, although the glossy finish means it's still very reflective and with lots of glare. The anti-glare coating helps a little, though.

Performance

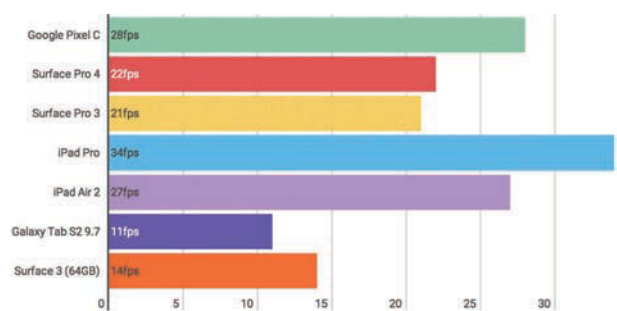
As with the Chromebook Pixel, the C is one of the most powerful Android tablets we've seen. It's the first to use the nVidia Tegra X1 chip, which runs at 1.9GHz and has 3GB of RAM.

In general use it's fast, switching between apps with ease and generally performing at the level

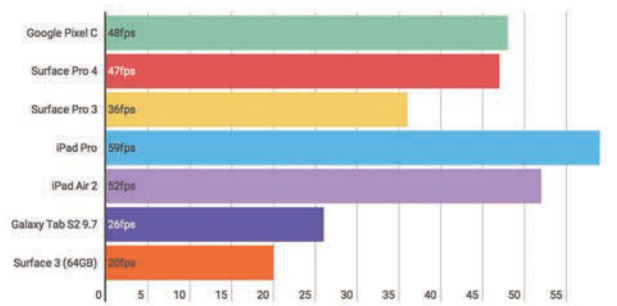
Geekbench 3



GFXBench Manhattan



GFXBench T-Rex

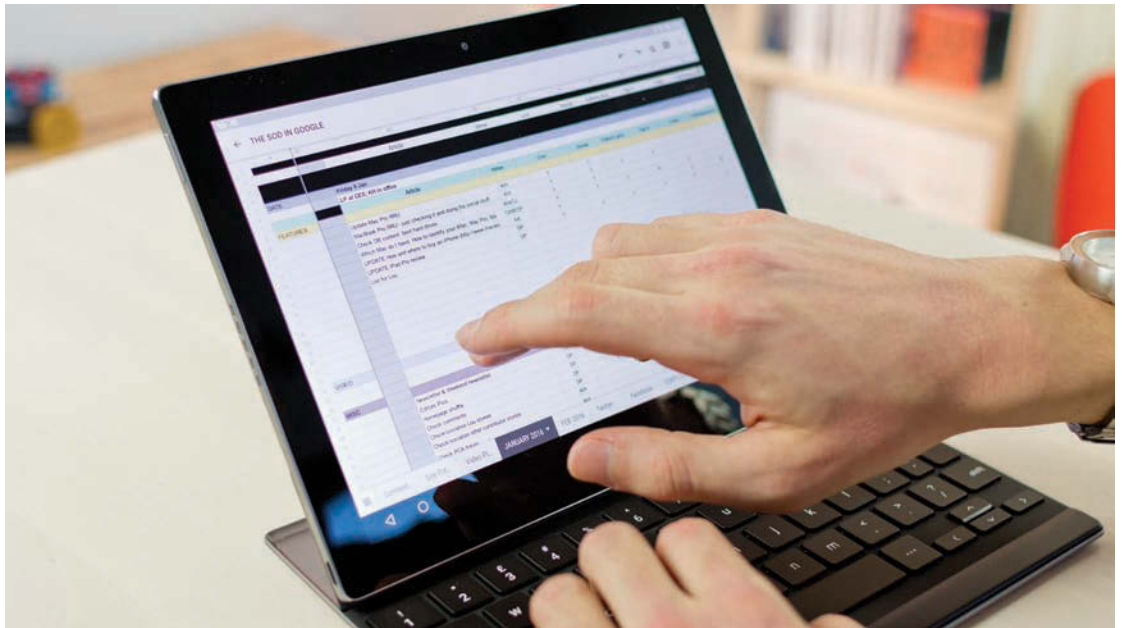


you'd expect from a brand new top-end tablet. It didn't break records in Geekbench, though, managing 4048 in the multicore 3 test. For reference, the Air 2 scored 4643.

We expected it to outperform the Air 2 in GFXbench, but it was neck and neck: ahead for Manhattan at 28fps (versus 27.3fps), and behind in T-Rex with 28fps against the iPad's 52.4fps. The Pixel's extra 200 rows of pixels mean it isn't quite a fair comparison, but it's similar enough.

Of course, the iPad Pro is a better comparison if you want to talk productivity. It scored 3086 in Geekbench 3, and that's just the single-core result (the Pixel C can manage just 1806). When you add the iPad Pro's other core (Apple has never confirmed it's a dual-core, but it's been shown to be dual-core in tear downs) the figure increases to 5406. You probably wouldn't buy an iPad Pro to play games, but it has decent power there, too: 33.3fps in Manhattan and 51.4fps in T-Rex.

Google has fitted the Pixel C with a 34.2Wh battery that lasts



ages. This is partly thanks to that clever screen tech and in our tests, it happily lasted several days of use while we tested it out by running benchmarks, writing the review itself, playing games, watching videos and testing out the cameras.

A neat feature is that the lightbar on the back (which illuminates with the red, blue, yellow, green Google colours) shows the battery level when you double-tap it. It's only a rough indication, but it's handy nonetheless. It will light up red when the battery level is critical.

In Geekbench 3's battery rundown test, which we run after setting the brightness to 120cd/m² (that's well below half on the Pixel C), it lasted a shade over 8.5 hours. That's a little disappointing as Google claims a 10 hours of use. In the box you get a 'quick' charger which charges the tablet from empty to almost

20 percent in 30 minutes. It takes three hours to reach 70 percent, and about four hours to full.


Cameras

When the need arises, the Pixel C has an 8Mp camera tucked away in the corner on the rear. It will shoot sketchy 1080p video and reasonable photos. Quality isn't bad for a tablet, but you'll get better videos from an iPad Air. Neither offers optical stabilisation, but the iPad's software stabilisation is more effective.

Below left is our standard photo of St Pancras. Below right is a 100 percent crop, so you can see the detail captured, which is far from the best we've seen.

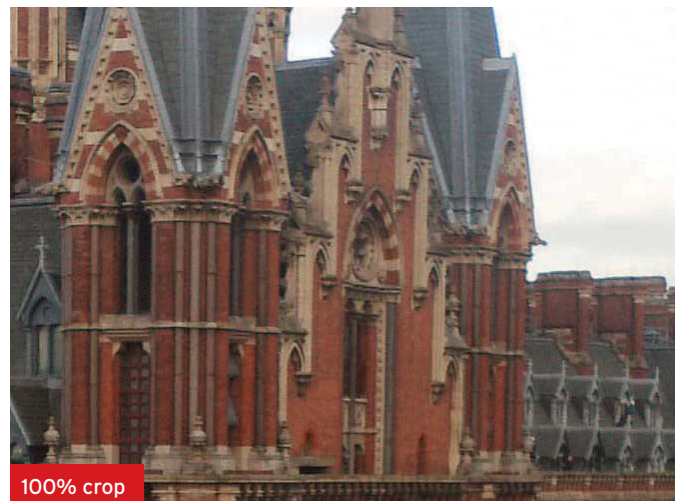
At the front, the 2Mp camera is good enough for selfies and fine for Skype chats, or Hangouts as Google would prefer you to use its own video service.

Verdict

As a standalone tablet, the Pixel C is superb. It's better than the HTC-made Nexus 9, which was great but not exceptional. Which the 'C' most certainly is. Storage is a bit limited, but if you can live with 32GB it's good value at £399. Paying an extra £119 for the keyboard is something we can't see many buyers doing, though. If typing is a priority, you'd be better off spending your £518 on a decent ultraportable laptop as Android Marshmallow - good as it is - isn't nearly as versatile as Windows. And while the keyboard is well designed, you'll still prefer a full-size laptop keyboard. If you need to run Windows apps, the consider the Surface 3 which is slightly cheaper - even with the optional keyboard - but remember that there are even cheaper options such as the Asus Transformer T100HA.  **Jim Martin**



Standard photo



100% crop

£269 inc VAT**Contact**■ hp.com/uk**Specifications**

15.6in (1366x768, 100dpi)
 TN matt anti-glare; 2.2GHz
 AMD A8-7410 (2.5GHz
 boost) 4C, 4T; AMD Radeon
 5 integrated GPU; 4GB
 1600MHz DDR3 RAM; 1TB
 5400rpm SATA HDD;
 gigabit ethernet;
 802.11b/g/n single-band 1x1
 MIMO; Bluetooth 4.0; tray-
 load DVD±RW drive; 1x
 USB 3.0, 2x USB 2.0; HDMI
 1.4, VGA; Kensington
 Security Slot; SDXC card
 slot; stereo speakers;
 0.3Mp webcam; single mic;
 3.5mm headset jack; UK
 tiled keyboard with
 numberpad; two-button
 trackpad, 110x46mm; 31Wh
 lithium-ion battery,
 removable; 45W mains
 adaptor with IEC C6 inlet;
 385x255x24.6mm; 2150g

Build: ★★★★★

Features: ★★★★★

Performance: ★★★★★

Value: ★★★★★

**LAPTOP****HP 255 G4**

The 255 G4 is a budget 15in laptop with a 2.2GHz quad-core AMD accelerated processing unit (APU), a processor that includes integrated graphics - like Intel's Core series chips, only Radeon-branded and potentially more powerful than Intel HD Graphics counterparts.

Price

The sweet spot for a good laptop with a tolerable display, quick components and respectable build quality is still around £500 or more. If that's more than you'd rather pay, there are plenty of options below £300 such as this AMD-powered HP laptop for £269, supplied for review by Ebuyer. And since there's £30 cashback (at the time of posting), it's an even more affordable £239. The part code, which ensures you're buying the configuration reviewed here, is P5T27ES#ABU.

If that's too much, then there's an even cheaper version with a 500GB hard drive and an even slower processor for £219. That's with £10 off; the normal price is £229.

Design

All the basics for a working cut-price laptop are here - a 1366x768-pixel display with gross colour shift when viewed at any angle other than square-on, a serviceable if clackety low-profile tiled keyboard, and a relatively cooperative trackpad blended into the rough textured top deck. This has real click buttons, the safer option on basic devices where low-cost and buttonless touchpads usually spells trouble.

The case is all black, plastic and textured, with some flex should you hold it the wrong way. Unlike some laptops, there's no easy way in to upgrade or replace internal components.

Helping keep the price down is the combined CPU/graphics chip from AMD, the A8-7410 with integrated Radeon 5 graphics. This is clocked at 2.2GHz and boasts an insignificant boost to 2.5GHz on demand, contrasting with Intel's Turbo mode which unlocks more headroom beyond the baseline. An internal fan can be heard at all times, even when the laptop is simply idling. Memory amounts to 4GB and storage sits



on a sizeable but all-too ponderous Toshiba 1TB disk.

Classic accoutrements include a pop-out tray DVD±RW drive on the right side. USB ports total three, one of them USB 3.0, although not clearly identified, so choose carefully if you need decent peripheral speed. Displays can be connected via VGA or HDMI ports on the left. You also get basic 802.11n Wi-Fi and Bluetooth, plus a wired network port - and increasingly rare sight these days. All the essentials and no frills, then.

Performance

AMD processors typically fall far behind Intel in raw performance and battery economy, and lab results for the HP 255 G4 confirmed that trend. This chip returned Geekbench results of 1391 and 4007 points in single- and multi-core tests. For reference, that's lagging behind 2015's iPad Air, which scores around 1815 and 4515 points respectively, the latter result fielded with fewer processor cores too.

The PCMark 8 Home test scored just 1863 points when aided by the Radeon graphics; and 1725 points propelled by the main CPU only. Asus' more expensive X555LA-XX290H is a bit faster at 2028 points.

Don't expect much gaming fun here. If you reduce resolution below screen native to 1280x720 and use lowest detail, you could see average framerates of 28fps playing Batman: Arkham City, maybe even 30fps in Tomb Raider. Again, the Asus is marginally quicker, managing 30fps at 720p.

HP fits a tiny 31Wh detachable battery, enough to power the laptop a little over four hours in the streamed video test, albeit on an easier footing than other laptops since the dim display couldn't even manage our 'medium brightness' reference 120cd/m² level. At its 96cd/m² brightest, the runtime was four hours six minutes - just over the four hours HP claims.

Our sample was bizarrely bundled with a power adaptor with detachable BS 546 5 A cable. Otherwise known as IEC Type D, this miniature mains plug with round pins is still popular in parts of Africa. This may have been a one-off due to it being a sample, but UK users will need to find an appropriate 'clover leaf' cable to fit the charger if it's standard issue.

The cheap PWM-controlled display measured at just 80:1 contrast ratio and could provide only 62 percent of sRGB colour, meaning milky washed-out images. And with average Delta E up at 9.5 the colours it could show drifted appreciably from specification. In its favour it, at least, had a matt anti-glare coat. This kind of screen quality is typical of budget laptops, so it's not worse than its competition in this respect.

Verdict

The HP 255 G4 is a budget 15.6in Windows laptop, with budget build and performance. We found no single serious flaw and it should get the job done eventually, making it ideal if you're on a tight budget and don't need lots of speed or a high-quality screen. **Andrew Harrison**

£1,029 inc VAT

Contact

■ dell.co.uk

Specifications

15.6in (1920x1080) IPS 16:9 screen; Windows 10 Home Intel Core i5-6300HQ sixth-generation 'Skylake' chip; 8GB 2133MHz DDR4 RAM (4GB x2); 1TB 5400rpm HDD + 32GB SSD (SATA); 2x USB 3.0, Thunderbolt 3 (also supports USB-C 3.1 Gen 2); DW1830 3x3 802.11ac 2.4/5GHz + Bluetooth 4.1; Mini-DisplayPort; headset jack; SDXC reader; Noble lock slot; 720p webcam; 56Wh lithium-polymer battery, non-removable, 1 year warranty; 357x235x11-17mm thick, 2kg

Build: ★★★★★
Features: ★★★★★
Performance: ★★★★★
Value: ★★★★★



LAPTOP

Dell XPS 15 9550

The XPS range is where you'll find Dell's most desirable laptops. These aren't all-practical workstations, or budget models. XPS is where Dell's fanciest designs team-up with higher-end components.

This is the larger of the two Dell XPS models, the XPS 15. Much more than just a larger version of the XPS 13 this one trades away stamina in order to pack in a high-power CPU and a graphics chipset that'll let you play recent games without making the visuals look like those of an original Xbox title.

Price

These abilities don't come cheap, though. We're looking at the very lowest-end Dell XPS 15 spec, which costs £1,029 from Dell and makes some significant sacrifices to even get down to that price.

Namely, it has a 1080p display rather than a 4K one, and a hybrid drive rather than full SSD storage. If you're drawn to the XPS 15 because you've heard about its flashy Infinity Edge 4K screen, you'll need to pay at least £1319 for that.

To see the XPS 15 at the height of its powers you'll want to buy the £1,489 model, which has a 512GB SSD rather than a hybrid drive.

Design

No matter which spec you're after, the Dell XPS 15 gets you the same design and chassis. It looks and feels nice, but is not as flashy as some.

There's only about 5mm of plastic between the end of the display and the end of the laptop. This helps the Dell XPS keep very petite for a 15.6in machine - it's around the size of most 14in laptops

While there are better options out there if you're a road warrior, we had no problem carting in the Dell XPS 15 around in a rucksack and using it in a coffee shop for a few hours. It's 23mm thick, after all, and our review sample weighed slightly less than the stated 2kg at 1,945g. Dell says the SSD version is even lighter at 1.78kg.

The XPS 15's connectivity isn't much better than you average, well-equipped 13in laptop, though. You get just two USB 3.0 ports, a Thunderbolt 3 USB-C socket, a full-size SD card slot and a full-size



HDMI. It'll do the job for most, but if you want to use this as a main home PC you may need to get a USB hub involved to avoid having to swap over USB cables all the time. There's no ethernet port, and no included USB adaptor - it's optional.

It's also worth noting there are no 'special' design moves here. This isn't a hybrid, the screen hinge doesn't flip around 360 degrees (just 120-ish), and unlike some previous XPS laptops, you don't even get a touchscreen. Not in the version reviewed, anyway. The 4K models all have touchscreens.

The aim here is to pack traditional laptop power into a much more friendly and convenient shell.

Performance

Given that the XPS 15 is slim and light for a 15in laptop, it's a little surprising that it uses an 'HQ' series processor rather than the 'U' kind we normally see on portable-friendly models. The base model has an Intel Core i5-6300HQ. While not the top-end option you'll see in the more expensive XPS 15 models, it's still designed to eat up more power and run hotter than U-series chipsets.

These chipsets are designed to use just 15W, but this one's thermal load is 45W. Being happy to suck up more power lets these HQ chipsets push much harder, but it means they're less power-efficient and need a more serious cooling system.

As with pretty much any HQ-equipped laptop, the Dell 15's CPU fan runs all the time. It's a very light whirr, but if you dream of a totally silent laptop, this is not it.

Using a hybrid hard drive rather than a pricier SSD, our particular

review model also emits the light clicks when writing data, common to all hard drives. And it occasionally makes mysterious louder ones, too.

There's nothing magical going on in a hybrid hard drive, though. It gets you 1TB storage, but has an extra 32GB SSD attached, used as a cache to increase performance beyond that of a regular mechanical hard drive.

It works, but still doesn't quite seem to get you the instant zippiness of a pure SSD system. Powering-up and coming back from standby is quick, but not near-instantaneous. The CrystalDiskMark benchmark results show that it's no replacement for an SSD, too. While read speeds reach up to an SSD-alike 475MB/s, write speeds are around 70- to 80MB/s. That's the performance of a bog-standard 5400rpm hard drive, not an SSD.

This base spec isn't really designed for the most demanding of buyers, though. While it uses an Intel HQ series CPU, it's still a Core i5 rather than an i7, a quad-core i5-6300HQ 2.3GHz. Of course, when paired-up with 8GB RAM you still have enough power on tap to do virtually anything.

Serious video editing, involved Photoshop work and audio sequencing are not beyond its abilities - and you'd expect this north of a grand. The mid-grade spec leaves it with very solid middle-ranking benchmark results. For example, in Geekbench 3 it scores 9808 (3165 single core) points. The Intel Core i7 versions will, naturally, score much higher, but it's still much better than what you get from the dual-core 'U' alternative. That CPU

scores 5500-6000 in the XPS 13, a pretty dramatic difference.

It is what's common to all versions of the Dell XPS 15 we really need to take into account, though: the discrete nVidia GeForce GT 960M graphics card.

This is a good card, and one that doesn't demand the ultra-loud fans and heat vents that gamer-specific GeForce GT980M systems tend to have. For those with a bit of knowledge about graphics card families, you do need to consider the 'laptop tax' when it comes to mobile GPUs, though.

This spec is good enough to play recent games, including top-tier games like *The Witcher 3* and *Fallout 4*. However, to play at the native 1080p resolution you'll need to watch settings carefully. For example, in *The Witcher 3* we needed to drop down to 'medium' settings and switch off performance-sapping effects like nVidia Hairworks to reach a reasonable frame rate.

Compared to 'full-fat' desktop CPUs, the GT 980M is closer to the nVidia GTX 750 than this card's desktop namesake, the higher-end GTX 960. As with the CPU, it's all about the sort of hardware you can fit into a laptop shell without generating loads of heat.

This is a laptop for people who want to play games, but not one for hardcore gamers. That said, we were impressed with how the performance scales away from the charger. The GT 960M GPU isn't simply 'switched off' as soon as you unplug. You can happily game on the train with the XPS 15, and you can naturally fiddle with the performance settings to favour stamina or performance.

It's also very good at managing heat. While the fans run constantly, they don't become annoyingly loud even when the system is working flat-out. We also experienced none of the odd fan revving we heard when reviewing the XPS 13.

Keyboard and trackpad

The keyboard and trackpad are other pivotal parts of any laptop experience, and both are good in the Dell XPS 15. The keyboard is crisp, with decent resistance against your fingers that provides well-defined feedback for each keypress. It's a bit softer than a MacBook keyboard, but not dramatically so.

As you'd hope at the price, the keyboard is also backlit, using a set of white LEDs. You control the level using a one of the function keys, although it's limited to high-low-off. You don't get fine control.

The trackpad is clearly indebted to that of the MacBook Pro. It's a similar size, a similar shape and has a textured glass finish for that smooth, high-end feel. Among Windows PCs it's a great pad, with an easy but thoroughly clicky button action. This is one area where no Windows laptop can really touch Apple's designs, though, even those from the pre-Force Touch era (the pressure sensitivity now built into the latest MacBook trackpads). It's not miles off, mind.

Display

There's a good chance you don't want to hear about the display of the Dell we're reviewing. One of the series' key appeals is its 3840x2160-pixel screen, but we're looking at the baseline 1920x1080 version.

There are some very important things to note here, though. First, there's the thin-bezel design we mentioned earlier. Aside from the thick bit at the bottom, the top half of the XPS 15 appears almost all-screen. If you're upgrading from laptop a few years old, the different is quite alarming.

This is also a matt display, pretty unusual among 'premium' laptops. This reflection-busting screen finish is great if you want to use the Dell XPS 15 outdoors, and is also a good surface for gaming. You might not notice reflections of a lounge lamp while you're looking at a web page, but a dark *Skyrim* dungeon is much more likely to show it off.

The downsides of matt screens include more muted colours 'pop' a bit less and tend to make a raised black level a bit more obvious. Colour and contrast are still very good though. The display appears well-saturated, and while blacks aren't perfect, it is strong.

The one slight disappointment is the obvious one: resolution. Having used many smaller, higher-resolution laptops over the past couple of years, the slight blockiness of 1080p stretched over 15 inches is obvious. Of course, the glossy 4K versions of the Dell XPS 15 look immaculate in this respect. You'll just have to live with their highly reflective nature.

Contrary to what you might assume, it's not gaming or films that show up the limited resolution. The XPS 15 doesn't have the power for 4K gaming anyway, and 1080p films look fantastic on this display. It's text that makes you wish for a slightly higher ppi count. Characters just aren't that smooth.

Battery life

On the battery life front, you'll be glad of the lower-resolution screen. Due to the higher-power processor, the Dell XPS was never going to be a real battery stamina winner even with a 1080p screen.

Still, it could be a lot worse. Using the laptop for an hour as a simple word processor in indoors lighting requiring about 30 percent screen brightness, an hour took 17 percent off the battery life. With light use you'll get just under six hours between charges.

While plenty of HQ-series-CPU laptops do worse, it's pretty poor among XPS slim and light-ish laptops. If you need your system to last a full work day, look for one with a more efficient, lower-power CPU.

When playing back a high-quality MP4 video at 120cd/m² brightness, the Dell 15 lasts five hours 55 minutes. It's pretty much the same result we saw when using the Dell XPS 15 for 'normal' work. When laptops of this power level often last for four hours, or even less, it's not bad stamina as such. But we can't get around that some of you will be much better-served by a longer-lasting laptop like a Toshiba Portégé Z20t or Lenovo ThinkPad X1.

Verdict

The XPS 15 is a great all-rounder. It offers a powerful CPU, a competent discrete graphics card, a screen happy with the outdoors and a frame that's light and slim given the rest of the spec. ☒ **Andrew Williams**



£899 inc VAT

Contact

■ asus.com/uk

Specifications

13.3in (1920x1080, 166ppi)
AAS matt anti-glare display; 2.5GHz Intel Core i7-6500U (3.1GHz Turbo) 2C, 4T; Intel HD Graphics 520; 12GB 1600MHz DDR3 RAM; 256GB mSATA SSD (SK Hynix); USB 2.0 to 10/100 ethernet adaptor included; 802.11ac dual-band 2x2 (Intel Wireless-AC 7265); Bluetooth 4.0; 3x USB 3.0; Mini DisplayPort 1.2, MDP to VGA adaptor included; SDXC card slot; stereo speakers; 0.9Mp webcam; dual mics; 3.5mm headset jack; UK tiled keyboard; buttonless trackpad, 104x73mm; 50Wh lithium-ion battery, non-removable; 65W mains charger with IEC C6 inlet; 322x222x19.4mm; 1419g

Build: ★★★★★

Features: ★★★★★

Performance: ★★★★★

Value: ★★★★★



LAPTOP

Asus ZenBook UX303UA



The ZenBook has proved an enduring ultraportable from Asus, just like the MacBook Air from which it was copied wholesale. The previous model we saw, the UX305F, was pared back in price and performance with the help of a low-power Core M processor; for the UX303UA, Asus has returned to a full-speed processor and is a great Windows alternative to Apple's 13in Air.

Design

The processor in the latest ZenBook is box fresh, a Core i7-6500U from Intel's new Skylake collection. This can accept DDR4 memory, although here receives a liberal 12GB of DDR3. For storage there's a usefully-sized 256GB M.2 SSD, connected by traditional SATA.

The 19mm all-metal casework is here given a champagne bronze coat with contrasting dark lid back. The trackpad is another large buttonless multi-touch type, and is thankfully more precise and usable previous ZenBooks. The keyboard is not backlit but perfectly serviceable, the stiff chassis underpinning an assured key action.

There are three USB 3.0 ports, plus HDMI and Mini DisplayPort, but no Thunderbolt option.

The display is a full-HD IPS-like panel with a matt anti-glare finish, which we much prefer over the glossy, reflective screens we often

see. It provides decent off-axis viewing - colours don't change hugely as you tilt the screen - and near-full (97 percent) sRGB coverage, plus 680:1 contrast ratio. Only the budget backlight spoils a near-ideal appointment, and some people may notice flicker from this type of backlight.

Wi-Fi is up-to-date with two-stream 11ac. For wired networking there's a USB 2.0 adaptor in the box, but only good for 10/100 ethernet operation. That should be enough for the odd occasion when you need a wired connection, though.

Performance

The fast CPU, speedy flash drive and large dollop of memory meant the UX303UA was unlikely to be found wanting in real-world performance. Returning scores of 3270 points single-core and 6912 multi-core, Geekbench revealed the raw speed available. PCMark 8 Home scored the ZenBook with an impressive 2765 points, rising to a remarkable 3448 points using GPU acceleration.

The main chip has a new graphics chip baked in, Intel HD

Graphics 520, with a 100MHz clock advantage over the former 6000 graphics in the previous generation. In tests this enabled assured gaming at 1280x720 pixels, and potential to just reach into native full-HD resolution at playable framerates. Batman: Arkham City averaged 43fps at the former size and Medium detail; but 27fps at 1080p and Low detail. Tomb Raider recorded 38- and 30fps respectively at comparable settings.

Battery life from the sealed 50Wh lithium-ion pack was far from the best we've seen, although the seven hours 48 minutes we measured in our wireless video streaming test still represents a good run for a Windows ultraportable.

Verdict

At around £900, the ZenBook UX303UA approaches the build finesse but lacks the unbeaten battery of the similarly priced MacBook Air, although it can claim faster processor performance and a superior full-HD matt display. This latest ZenBook is a well-balanced, smart and powerful Windows notebook. Andrew Harrison

The display is a full-HD IPS-like panel with a matt anti-glare finish, which we much prefer over the glossy, reflective screens we often see

£999 inc VAT**Contact**■ toshiba.co.uk**Specifications**

12.5in (3840x2160, 352ppi)
 IPS gloss touchscreen;
 Windows 10 Home; 2.5GHz
 Intel Core i7-6500U (3.1GHz
 Turbo) 2C, 4T; Intel HD
 Graphics 520; 8GB
 1600MHz LPDDR3 RAM;
 256GB M.2 SATA SSD
 (Samsung PM871); 802.11ac
 dual-band 2x2 (Intel
 Wireless-AC 7265);
 Bluetooth 4.0; 1x USB 3.1
 Type C Gen 2, 2x USB 3.0;
 HDMI; SDXC card slot;
 stereo speakers; 0.9Mp
 webcam; dual mic array;
 3.5mm headset jack; UK
 miniature tiled keyboard
 with white backlight;
 buttonless trackpad,
 105x59mm; 40Wh lithium-
 ion battery, non-
 removable; 45W mains
 charger with IEC C6 inlet;
 299x209x16mm; 1312g

Build: ★★★★★

Features: ★★★★★

Performance: ★★★★★

Value: ★★★★★

**LAPTOP/TABLET****Toshiba Satellite Radius 12 P20W-C-106**

Laptops that are also tablets are commonplace now, but unlike the Surface Pro 4, this type has a keyboard, which folds behind the screen rather than detaching completely. It runs Windows 10 which, while not the greatest tablet operating system, still represents an improvement over Windows 8.

You can buy the Radius 12 for £999. The high price reflects some of the select components used, namely a sixth-generation Intel Core i7 processor, 4K UHD touchscreen and 256GB SSD. These are packed in casework crafted from stamped aluminium, here given a bronzy-gold lustre and complementary brown plastic hinges.

Design

With its 3840x2160 IPS panel squeezed into a 12.5in frame, it has an insanely high pixel density of 352ppi. Windows 10 is preset to 250 percent scaling to restore usability although we found this still rendered the interface rather small; 300 percent was more readable.

The Radius name points to hinges that allow folding the display all the way back to create a 16mm slab that functions like a touchscreen tablet. At 1.3kg, it's a lightweight laptop – or one overweight Windows tablet that quickly tires supporting arms.

A useful selection of ports includes one USB 3.0 each side,

plus HDMI and an additional USB 3.1 Type-C on the left. This promises Gen2 specifications, handy for future peripherals. The right side has the power switch, recessed and tricky to operate, along with similarly stubborn volume rocker and Windows Cortana buttons.

Toshiba fits a miniature keyboard that we found too small for relaxed use with our large hands, yet wastes open space either side of the keyboard. The buttonless trackpad has a brushed finish to match the case and lacks decent control precision.

The Radius stayed cool in use, although its multi-speed fan frequently revs up and down as the laptop is put to work. Sponsored software includes Toshiba's familiar partner WinZip, with 500MB of bloatware that removes easy access to Windows' built-in unzipping tool.

Performance

A 2.5GHz Core i7-6500U provides dual-core processing, incorporating Intel HD Graphics 520 for the UHD display. This is joined by 8GB of fixed 1600MHz memory, while a Samsung PM871 M.2 SATA SSD gives fast storage.

PCMark 8 Home appreciated the above collection, awarding 2330 and 2735 points respectively for conventional and GPU-accelerated workloads. Focusing on just CPU

and memory, Geekbench scored one core with 3227 points, and two cores 6833 points – sterling results.

Graphics were a mixed bag. Tomb Raider ran smoother than the Asus ZenBook UX303UA, opposite, using the same chip (47- versus 38fps, 720p and Normal detail). Full-HD gameplay was just possible (34fps) albeit in Low detail.

The Radius struggled to complete the Batman: Arkham Asylum though, pausing in the same place mid-game each run, returning a 38fps average at 720p and Medium detail, behind the ZenBook's 45fps.

Screen measurement echoed the subjective good impression, with 800:1 contrast ratio, if slightly reduced 90 percent sRGB colour coverage. Thankfully flicker-free, the display is glossy and too reflective for relaxed use in bright lighting.

The 40Wh fixed battery let the Radius run for just five hours 21 minutes in the streaming video rundown, far short of the best.

Verdict

Bagging a 4K UHD display may seem impressive but here it's wasted. A small battery plus high-res touchscreen equals foreshortened runtime. The Radius is quick but annoying on too many levels. For a better overall experience, try the ZenBook UX303UA, which is £100 cheaper. **Andrew Harrison**

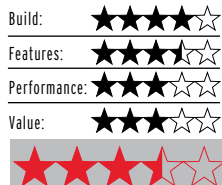
From £129 inc VAT

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amazon.co.uk

Specifications

8in (1280x800, 189ppi) touchscreen; quad-core 1.5GHz processor; 1GB RAM; 802.11ac Wi-Fi (2.4GHz and 5GHz); Bluetooth (with support for A2DP); Rear 5Mp camera, front 0.9Mp camera; 8- or 16GB internal storage; microSD slot for up to 128GB additional storage; 214x128x7.7mm; 311g



TABLET

Amazon Fire HD 8

Launched in late 2015, the Fire HD 8 is from Amazon's fifth-generation tablet range. It shares much with the other two models launched at the same time: the £49 Fire and the 10.1in HD 10, but is notable as it's the first 8in tablet from the company. Previously, there was just one 'large' option: the HDX 8.9.

We're reviewing the HD 8 and HD 10 together here because they're so similar, but our comments on performance, screen quality and battery life are based on the HD 8.

Price

You can buy a Fire for £129 from Amazon. For some people, an 8in tablet for under £130 represents good value. An iPad mini 4, which also has an 8in screen, costs £319. There are reasons for the huge price difference, but if you're just looking for an 8in tablet, the HD 8 is at the cheaper end of the scale. However, it begins to look expensive when compared with its 7in sibling - the Amazon Fire - that costs only £49.

Even more expensive is the HD 10 which costs £169 from Amazon.

As usual, this is the base price, so you'll have to put up with adverts on the lock screen unless you opt to pay an extra £10 when ordering. And you'll get only 8GB of storage unless you pony up an additional £20 for an extra 8GB. (With the HD 10, the base model is 16GB, and it's £30 to upgrade to the 32GB model.)

Cases start from £29, rising to £39 for the leather versions. Third-party cases are also available cheaper, but we'd imagine most people will want to show off the bright back panel and not bother with a fitted case.

Design

As long as you're not expecting premium iPad-style build quality, you won't be disappointed. Like certain other tablets, and the iPhone 5c, the HD 8 is unashamedly plastic. It's available in glossy orange, magenta and blue finishes, or black if you prefer a more understated approach. The HD 10 doesn't have the outlandish colour options, with a choice of either black or white.

Under the HD 8's plastic is a metal frame, and the result is



a striking tablet that feels solid and sturdy despite its slim 7.7mm thickness and light weight of 311g. The HD is obviously heavier, but 432g is very light for a 10.1in tablet: the 9.7in iPad Air 2 weighs 437g.

Just like the 7in Fire, the HD 8 and 10 have all their ports and buttons on the top edge. Stereo speakers reside on the lefthand edge, or the bottom if you're holding it sideways to watch a video or play a game. They're pretty loud, too, and certainly better than the Fire's mono speaker. In fact, they're almost certainly better than any smartphone speakers, and the Dolby Audio logo doesn't harm that company's reputation unlike some similar logos we've seen on laptops.

Front and rear cameras are slightly better too, although they don't justify the price hike from the 7in model. More on those later.

You also get a slightly faster quad-core processor, running at (up to) 1.5GHz instead of 1.3GHz.

Screen resolution is higher, too, but again it's nothing to get excited about. The 1280x800-pixel screen gives an adequate 189ppi (common on tablets as far back as 2012), but we've seen better at this price - notably the no-longer-on-sale Tesco Hudl 2.

Image quality is good, though, with vibrant colours and good viewing angles. It's laminated, too,

so there's a solid feel when you tap, and the image appears right at the surface as opposed to sunken some way below as you get with lesser, non-laminated screens. If you'd prefer a Full HD screen, it isn't too difficult to hunt down a Nexus 7 (2013 model) or an LG G Pad 8.3.

Internal storage is limited to 8- or 16GB but there's a microSD slot for adding more, up to 128GB. You can do that on the 7in Fire, too, but the HD 8 has upgraded Wi-Fi: dual-band 802.11ac. For most people, the difference will be negligible, not least because 802.11ac routers still aren't too common.

Performance

Like the screen's resolution, performance is best described as adequate. It's better than the £49 Fire, but it's not as good as a premium tablet. So pretty much what you'd expect, really. It's fine for casual games, browsing the web or photos, watching catch-up TV and sending emails.

You'll see the occasional judder and delay when navigating around Amazon's Fire OS 5 operating system, and you'll sit there waiting for a few seconds while apps and games load. But once they do, it's generally plain sailing.

The HD 10 has the same internals, so performance is the same since the screen resolution

is identical. In fact, the low pixel count means game performance is better than it would have been if Amazon had opted for a Full HD screen: more pixels means fewer frames per second if you keep detail levels the same.

Battery life is a somewhat mixed bag. Amazon does good power management, so that the battery doesn't drain if you leave it in standby for a few days. Plus, if you're just browsing the web or using other undemanding apps - reading a book, say - you'll find the battery will last for longer than the eight hours Amazon claims. But stream videos from Prime Instant Video and you'll see a shorter time between charges.

Games which use the tablet's full processing power will drain the battery the quickest, and if you stick the screen to full brightness (which isn't blindingly bright) you'll be lucky to get more than four continuous hours of use. Recharging is a tiresome process, partly due to the low-power charger Amazon supplies. It takes several hours.

Fire OS

In essence, Fire OS 5 is a lot like Android Lollipop on which it's based, but lacks any Google apps or services. You can use most via the web browser, but if you want the YouTube, Gmail or Maps app, you're probably going to prefer to buy an Android tablet. And if you subscribe to Google Music, there's no app available for an Amazon tablet.

If you're an Amazon Prime member, or you subscribe only to the video or music services, the HD 8 has tight integration so you can access them. But while you'd expect that, you might get a little annoyed by how each of the 'home' screens tries to get you to buy content from Amazon.

Sometimes it can be hard to see the stuff you own, so filled are the screens with recommendations from the various Amazon stores, be it apps, games, books, music or video.

Another issue we hope Amazon will address is the search bar. This tends to display a list of web search results instead of what you expect: either stuff on the tablet itself or content from the app store.

Flip to the Apps home screen and the search bar label changes to 'Search Apps'. But type in 'Skype'

and you end up looking at some Bing results (there's no Google, remember) instead of being taken to the Appstore to download Skype. To do that, you have to tap on the shopping cart, labelled Store.

Thanks to Amazon Underground - a part of the Appstore which contains only 'truly free' apps - there are at least plenty of games and apps that won't cost you a penny. Plus, the selection in the main store is better than a few years ago. You can get BBC iPlayer, the new ITV Hub, All 4, Demand 5 and even the UKTV Play app which lets you catch up on shows from Dave, Yesterday, Really and Drama. It's possible to download shows from iPlayer and All4 to watch later, so as far as free UK catch-up TV goes, Amazon has it fully covered now.

Holes become evident if you have smart home products you want to control, although you're in luck if you have a Hive thermostat or a Fitbit. If you get stuck, the Mayday service means you can get support directly on the tablet, and if you have kids, there's great parental controls when you use the Fire For Kids app.

A handy new feature - for late night use - is Blue Shade. This cuts out the blue light which LCD screens emit and which is said to prevent you falling asleep quickly. You can choose a colour from 'red candlelight' to 'yellow moonlight'. It's something we wish other devices had built in as standard.

Cameras

The HD 8 and 10 have 5Mp rear cameras, which are in theory an upgrade from previous Amazon tablets. They shoot at 16:9 by default, but a toggle switch in the options lets you switch to 4:3 to get the full 5Mp, which is 2560x1920.

The camera app has a simple, easy-to-use interface and advises when you need to enable HDR in situations where there's high contrast. You'll see this a lot, but switching on HDR means it takes a couple of seconds to capture and process multiple shots, so you need to keep the tablet still.

Unfortunately, no matter what you do, photos look pretty terrible. Saying they lack detail and sharpness is an understatement. Below is a full, original unedited photo from the HD 8 which appears



to show heavy-handed compression which wipes out a lot of detail so that the brickwork of St Pancras is just a smudgy mess (see above).

The HDR mode does improve the exposure - and creates a file roughly 50 percent larger - but the same flaws in image quality remain.

Video is shot at 720p by default, but another toggle switches to 1080p. There's no stabilisation, which isn't surprising, but quality is still below par. The same criticisms apply: a general lack of detail and sharp focus. Overall, it's a dismal failure of a camera.

The front camera has a 0.9Mp sensor and is fine for Skype but selfies are grainy and not all that flattering.

Verdict

Unless you're reading this review because you've spotted the HD 8 or 10 in a sale, they're not great value at full price. They're fine for casual users and once you've got to grips with the interface, they're pleasant to use and have some useful features - especially for kids. Performance could be better, but it's good enough for most people, as is the screen - despite the relatively low resolution. The lack of Google apps will put off some, as will the sheer amount of advertising throughout, but Amazon customers - particularly those who subscribe to Prime services will find it all useful. However, unless you really need a bigger screen, the 7in Fire is much better value at only £49 **Jim Martin**

From £629 inc VAT

Contact

■ sony.co.uk

Specifications

5.5in 4K IPS (3840x2160, 806ppi); Android 5.1 Lollipop; 2.2GHz Quad-Core Qualcomm Snapdragon 810 CPU; Adreno 430 GPU; 3GB RAM; 32GB internal storage; microSD slot (up to 200GB); 23Mp rear camera AF with LED Flash; 5Mp front camera; Video recording at up to 2160p; Wi-Fi up to 11ac; Bluetooth; NFC; 4G LTE Cat 6; Nano-SIM; 3430mAh battery; dust and waterproof (IP68); 76x154x7.8mm; 180g

Build: ★★★★★

Features: ★★★★★

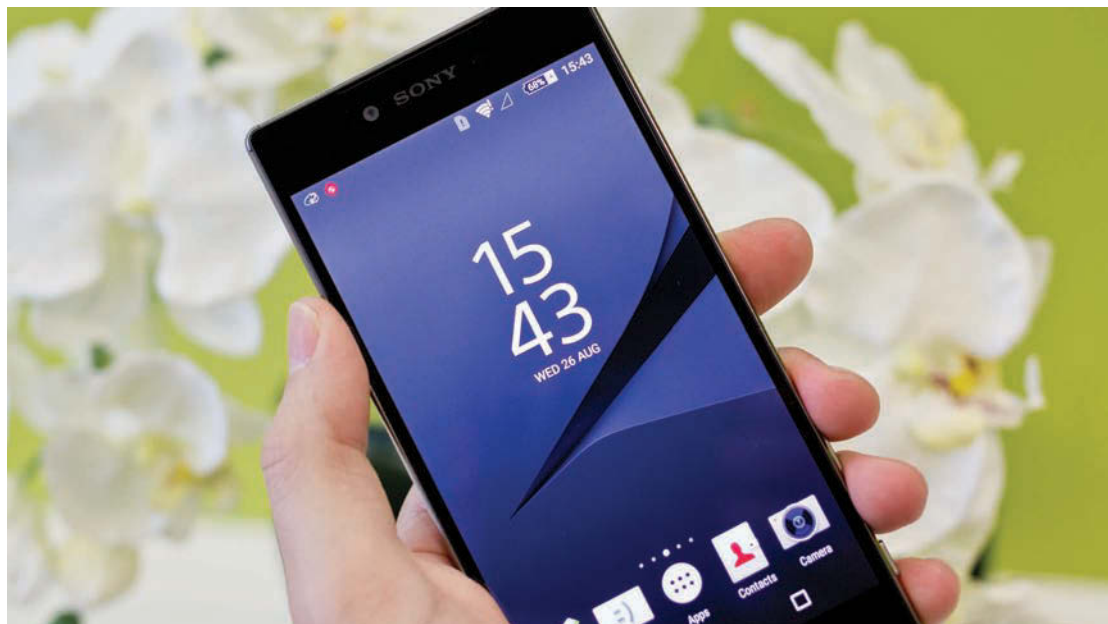
Performance: ★★★★★

Value: ★★★★★



SMARTPHONE

Sony Xperia Z5 Premium



The Xperia Z5 Premium is the first 4K smartphone to go on sale, and as you might expect, the price lives up to its name - it will set you back a whopping £629. This makes it one of the most expensive phones on the market, along with the Apple iPhone 6s Plus (£789) and the Samsung Galaxy S6 Edge+ (£719).

Design

This is the most recognisable of the Xperia Z5 range (we've previously looked at the Z5 and Z5 Compact). It's the largest model and has a shiny mirrored finish. The device is available in Chrome, Gold and Black - we took a look at the very bling Chrome option.

It might make the device look fancy, and you can check your make-up or do your hair by looking in the back, but you'll be forever polishing it to get rid of fingerprint marks and smudges that appear the first time you pick it up. Things go from gleaming to grubby in a matter of seconds, so we prefer the frosted glass of the other Z5 handsets.

If you can bear owning a phone this shiny, then the Z5 Premium has the same design features as its smaller counterparts. For example, it's dust- and waterproof, with only a flap to cover the slot that houses the SIM card and microSD card slot.

The round power button has been replaced by a flat rectangle along the side. To access the device, you need to use the built-in fingerprint

scanner. In our tests, this proved to be fast, accurate and is located where your thumb naturally lies.

At 7.8mm, the Premium is a little thicker than the regular Xperia Z5, but weighs a hefty 180g. This is big and more than other similarly-sized phones - even the brick-like OnePlus 2 is lighter at 175g.

Another gripe is that the volume rocker is situated below the power button, making it awkward to use.

Display

Sony has skipped Quad HD and instead opted to use a 4K display. The 5.5in screen has a 3840x2160 resolution, meaning a massive pixel density of 806ppi. That easily beats the Galaxy S6, which has 577ppi.

In comparison with the regular Xperia Z5, the Premium model doesn't offer as much in the way of brightness, and colours are slightly less punchy - the latter is more a personal thing and we actually prefer it a bit more laid back.

For most of the time, the Z5 Premium uses Full HD resolution rather than 4K. There are a couple of reasons for this. First, individually driving all those pixels 100 percent of time would result in a serious dip

in both performance and battery life. Secondly, Android 5.1 Lollipop doesn't support 4K resolution. Marshmallow does, and the phone's OS is set to be updated, but even then the new software is designed for up to 640ppi only.

So when exactly do you get 4K on the only 4K phone around? Well not often. You need to open Sony's own Album, and Video apps to display content in the full resolution. This means you're most likely to see 4K when viewing photos and videos you've captured with the phone. Third-party services such as Netflix and YouTube have 4K content, but you won't be able to access this on the phone.

Hardware

The Z5 Premium has a Qualcomm Snapdragon 810 processor, 3GB of RAM, 32GB internal storage and a microSD card slot for adding up to 200GB. As you can see on the opposite page, this phone benchmarked almost identical numbers to the regular Z5 due to the downscaling of the resolution.

The battery is larger, since there's more space for it, but battery life is similar to the Z5. The 3430mAh

We love that Sony has kept the physical two-stage camera button, which makes photography that bit easier and feels more professional



capacity provided five hours and 49 minutes, with a score of 3491 in our Geekbench 3 test. Not a bad result but still two- or three hours behind the leaders.

As you would expect from a phone that costs over £600, you get a lot of the latest tech. It has dual-band 11ac Wi-Fi, Bluetooth 4.1 with aptX, NFC, GPS and support for 4G LTE networks. The Micro-USB port is waterproof, though we'd like to see wireless charging included for such a high-end phone.

The premium has a 23Mp camera, with improvements such as faster auto focus (just 0.03 seconds according to Sony), x5 digital zoom without a loss of quality and decent low light performance.

We love that Sony has kept the physical two-stage camera button, which makes photography that bit easier and feels more professional. The focus is amazingly fast and is easily one of the quickest we've seen, helping you shoot more freely.

By default, the camera shoots at 8Mp, not the full 23Mp, so that the extra pixels can be used for oversampling. We're not convinced by the Clear Image Zoom feature, and while low light performance is good, the lack of optical stabilisation is a big omission here and something we'd expect Sony to offer.

At the front is a 5Mp camera which is good but nothing special. See our group test on the best smartphone cameras on page 64.

Software

As we touched on earlier, the Z5 Premium comes preloaded with

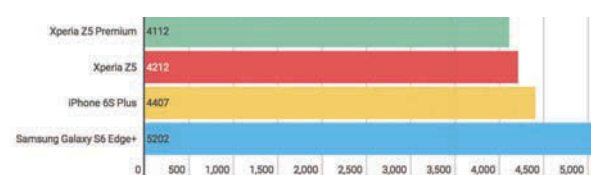
version 5.1 Lollipop. Sony hasn't done much on the software side, so it's more about the design and hardware here. As with previous Xperia phones, the user interface is vanilla - Sony has decided to use the stock Android Lollipop notification bar and recent apps menu. It does, however, add all the Sony style, such as wallpapers, widgets, floating apps, plus its own-brand apps, including Walkman and PlayStation.

Every Z5 model comes with Xperia Lounge Gold access and third-party apps such as OfficeSuite, AVG, Dropbox and Facebook. These do take up space and we'd rather choose what to install, but Sony does allow you to uninstall them.

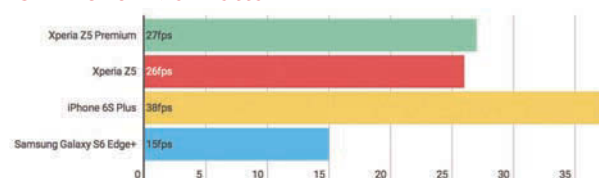
Verdict

A 4K smartphone might seem like something you want, but you

Geekbench 3



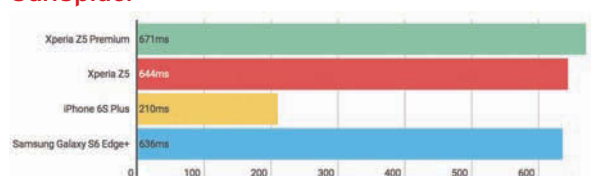
GFXBench Manhattan



GFXBench T-Rex

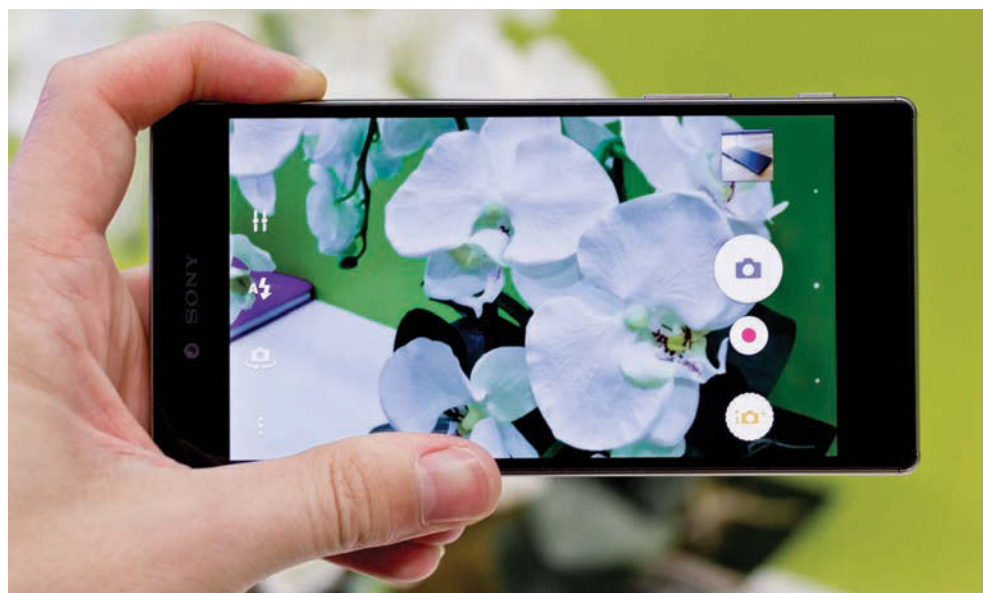


SunSpider*



* lower is better

really don't need it and it's an expensive extra. The device is also big, uncomfortable and brash. The hardware is the same as that used in the regular Z5, so it really comes down to the screen, which doesn't even display 4K much of the time. We strongly recommend steering clear of the Premium, sticking instead to the regular Z5 or one of its alternatives. **✗ Chris Martin**



£122 inc VAT

Contact

umidigi.com

Specifications

5.5in full-HD (1920x1080) IPS display; Android 5.1 Lollipop with Rootjoy support; 1.3GHz MediaTek MTK6753 64-bit octa-core processor; ARM Mali-T720 GPU; 3GB RAM; 16GB storage, plus support for microSD up to 64GB (uses second SIM slot); dual-SIM dual-standby (2x Nano-SIM); supports UK 4G LTE bands 3 and 7 (not 20/800MHz); 802.11a/b/g/n dual-band Wi-Fi; Bluetooth 4.0; GPS; OTG; 13Mp, f/2.0 Sony IMX214 camera with dual-LED flash; 8Mp, f/2.2 OV8858 front camera with LED flash; EyePrint ID eye recognition; fingerprint scanner; 3300mAh non-removable battery, charges over USB-C; 152.3x76.5x7.9mm; 148g

Build: ★★★★★

Features: ★★★★★

Performance: ★★★★★

Value: ★★★★★



SMARTPHONE

UMI Iron Pro

UMI has unveiled a Pro version of its Iron Android phone, adding a fingerprint scanner and USB-C. Our review sample was shipped to us by Coolicool, which currently charges £122.39 with free shipping to the UK. That's around the same price at which you can buy the original UMI Iron from Amazon UK; the new Iron Pro is also available at Amazon UK, but at the higher price of £129.99. We'll look at some of the differences between the two below.

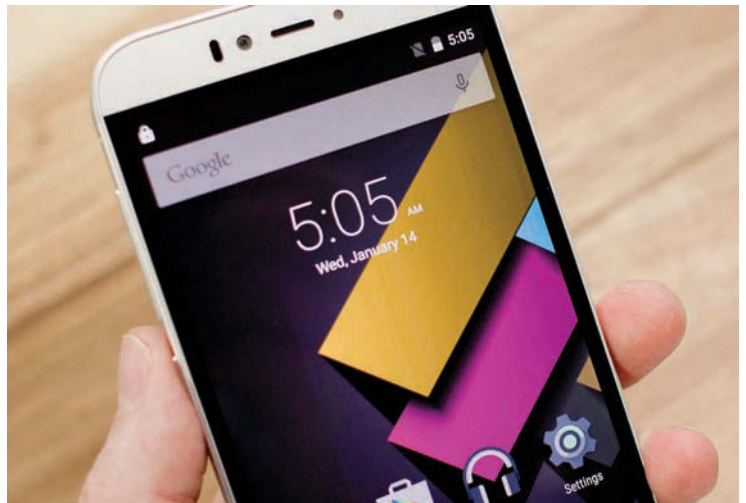
Design

Usually when you think of a Pro smartphone, you think of one that is either faster or has an upgraded screen or perhaps even a better camera over the original. The Iron Pro shows no advancement over the original Iron in this regard, and all that's new is the addition of a USB-C port and a rear fingerprint scanner. Performance in our benchmarks was slightly improved over the Iron, as we'll see below, but not because of any changes to the core hardware.

Actually, that USB-C port is more interesting than it sounds. Not only is USB-C faster but it's reversible, allowing you to plug in a cable any way up. Plus, the Micro-USB port on our original UMI Iron was oddly rectangular, making it difficult to fully insert a Micro-USB cable, so we're pleased that UMI has tackled this issue.

The fingerprint scanner is also cool, but we have the same issue with it as we do the EyePrint ID eye-recognition technology that's also built into this phone - given that you can bypass it by entering a password or PIN, it's only ever as secure as that lock code.

The fingerprint scanner is rear-mounted, which is a more convenient position than those that are built into the home button (the Iron Pro does not have a physical home button), and we like the fact that you can use the fingerprint scanner to wake the screen since no Smart Wake gestures are supported. If you were to use a pattern, PIN or eye-unlock feature, you would first need to tap the power button to wake the screen, and given that it's placed on the phone's left edge this could be an issue if you're protecting the Pro in a flip case.



The UMI Iron Pro is otherwise identical to the Iron before it. For a budget phone it's good-looking, and looks a little like a cross between an HTC, Samsung Galaxy and iPhone 6s Plus. As before it's made entirely from metal and glass, complete with metal screws should you need to access and replace the otherwise non-removable battery.

UMI fits the same 5.5in full-HD IPS screen, which is bright, clear and vibrant, and keeps to the same dimensions and weight at 7.9mm thick and 148g. The pulse notification light remains at the Pro's base, too, flashing various colours for different types of notifications, so you never miss a call or text.

One thing that has changed is the battery capacity, which makes sense given the identical weight, despite there being a new fingerprint scanner. Whereas previously the UMI Iron had a 3350mAh battery, on the box UMI now specifies only 3100- to 3300mAh.

Everything's exactly where it was before, with the aforementioned volume rocker and power button at the phone's top left edge, and a dual-SIM (or one SIM and one microSD card) slot-loading tray on the right edge. Even the heart-rate scanner still sits to the left of the front camera, though this time it actually works.

A headphone jack is found on the UMI Iron Pro's top edge, and on the rear a 13Mp camera protrudes slightly. This is protected with stainless steel, and paired with a dual-LED flash. At the front you'll

find an 8Mp selfie camera, also with an LED flash, which is necessary for the UMI's eye-recognition security.

Hardware

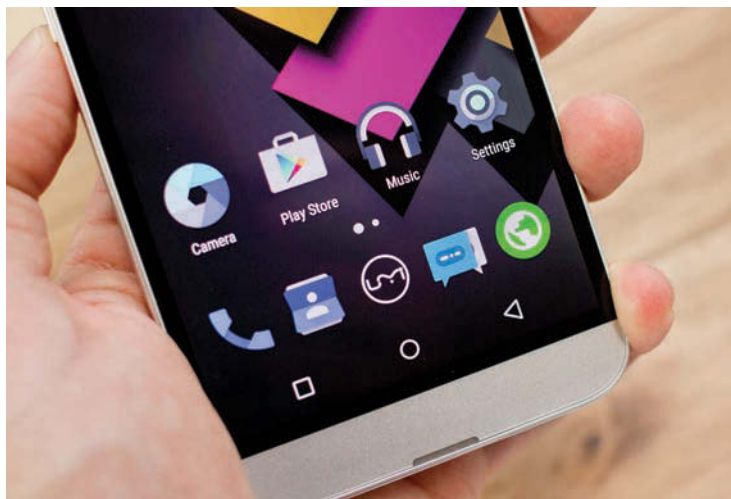
The Iron Pro runs the same core hardware as the UMI Iron and, save for the 3GB of RAM that sounds pretty good on paper, it's not of the level we'd expect to find in a 'Pro' smartphone. Nevertheless, the performance afforded by the 1.3GHz octa-core MediaTek MTK6753 processor and ARM Mali-T720 GPU isn't bad for a mid-range Android phone.

Bizarrely, the Iron Pro performed a little faster in our benchmarks than did the original Iron, although this is partly why all benchmarks should be taken with a pinch of salt - sometimes you can get different results from one minute to the next.

What really counts is real-world performance, and as with the original Iron, we have few complaints in this regard. Apps can take a couple of seconds to launch, but it's certainly not a painful wait.

While we're not convinced that the MediaTek chip is worthy of a 'Pro' phone, it's certainly worthy of a £122 phone. In Geekbench 3 we recorded 2839 points in the multi-core component, which is not only faster than the original Iron (2606) but also the Sony Xperia Z3 (2805), Nexus 5 (2800) and HTC One M8 (2761), and it's only a little way off the Samsung Galaxy S5 (2869).

For overall performance we also ran AnTuTu, in which the Iron Pro recorded 38,683 points; the original Iron scored 32,873.



We use SunSpider to test web-browsing performance, and the Iron Pro performed a little better than the Iron, with 1288ms against its 1552ms (lower is better in this test). This is way off flagship-level, but more impressive than phones such as the OnePlus 2 (1471ms), Moto G 2014 (1504ms), Vodafone Smart Ultra 6 (1545ms) and Sony Xperia M2 (1647ms).

Our final test is GFXBench, which measures graphics performance. Whereas the first Iron failed to even run this test, the second recorded 4fps in Manhattan and 13fps in T-Rex. That's by no means great but, again, for the money it's not bad.

Despite its reduced capacity, the 3100- to 3300mAh battery inside should still last a full working day. The Iron Pro does not support wireless- or quick charging, however.

The 16GB of storage is decent for a budget phone (many come with just 8GB), and it can be boosted using microSD up to 64GB if you don't wish to take advantage of the dual-SIM functionality.

Connectivity

And on that subject, the UMI Iron Pro can support two Nano-SIMs, which may be useful if you want to manage separate phone numbers for work and play, or tariffs for home and abroad, from one smartphone.

The Iron Pro can connect to UK 4G LTE bands 3 and 7, but not the band 20 (800MHz) that O2 (and networks that are based on O2, such as Giffgaff) relies on for 4G. Other connectivity specs include dual-band 802.11n Wi-Fi, Bluetooth 4.0, GPS and OTG. There is no support for NFC or HotKnot.

Cameras

The Iron Pro features the same cameras as the UMI Iron, which means there's the 13Mp, f/2.0 Sony IMX214 camera at the front with six precision lenses and dual-LED flash. The UMI now uses software to boost this resolution to 20Mp - that's in 4:3 aspect ratio; full-screen the most you'll get is 15Mp. All the usual modes are available, including HDR, Panorama, Live Photo and

Motion-Tracking. You can also get real-time previews of various filters.


Our test images were reasonable for a budget phone and with realistic colours, but despite the high resolution they still lack detail and show a fair bit of noise at full-size - it is impossible, for instance, to pick out individual bricks in the test image below left. We also took a photo of the same scene with HDR on, which failed to deal with shadows and highlights as well as some budget phone cameras we've tried (below right).

At the front is an 8Mp camera with, unusually, an LED flash.

Software

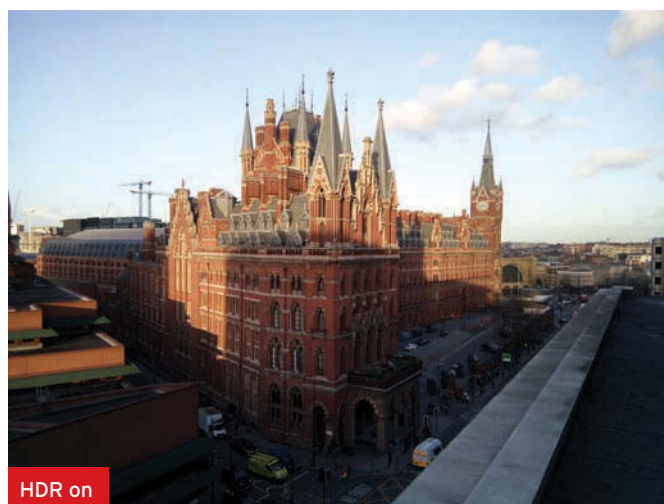
The UMI Iron Pro runs Android 5.1 Lollipop out of the box, but support for Rootjoy means you should be able to plug it into a PC or laptop and relatively quickly and easily install a new OS, including Xiaomi's MIUI. Rootjoy can also be used for backup purposes. UMI has added a handful of apps such as U Health, SuperSU and ViPer4Android, plus app permissions, the aforementioned Pulse notification light and the ability to configure a Guest user account. There are no smart wake gestures as seen in the UMI Iron, though.

Verdict

Aside from a fingerprint scanner and USB-C, there's not much new in the UMI Iron to justify the Pro moniker. However, for the money it's a decent mid-range Android phone, and the EyePrint ID eye scanner is pretty cool. Given that you can buy it for around the same price as the Iron, it makes sense to plump for the Pro version.  **Marie Brewis**



HDR off



HDR on

From £529 inc VAT

Contact

■ microsoft.com/en-gb

Specifications

5.7in AMOLED ClearBlack display (1440x2560, 518ppi); Windows 10; Qualcomm Snapdragon 10, octa-core (quad-core ARM Cortex A57 and quad-core A53 with 64-bit support); Adreno 430 GPU; 3GB RAM; 32GB internal storage; microSD card slot (up to 200GB); 20Mp rear camera with OIS, f/1.9 and triple LED-flash; 5Mp front camera; 11ac Wi-Fi; Bluetooth 4.1; NFC; 4G LTE; 3340mAh removable battery; 78x152x8.1mm; 165g

Build: ★★★★★

Features: ★★★★★

Performance: ★★★★★

Value: ★★★★★



SMARTPHONE

Microsoft Lumia 950 XL

Microsoft has launched two smartphones running Windows 10. In the previous issue we looked at the standard Lumia 950. This month we'll be looking at the larger and more expensive XL model - £529 compared to its little brother's £419.

Design

The Lumia 950 XL is pretty much just a bigger version of the regular Lumia 950. There are a couple of small changes, such as the camera module and the placement of certain elements, but its similar design is not really a good thing.

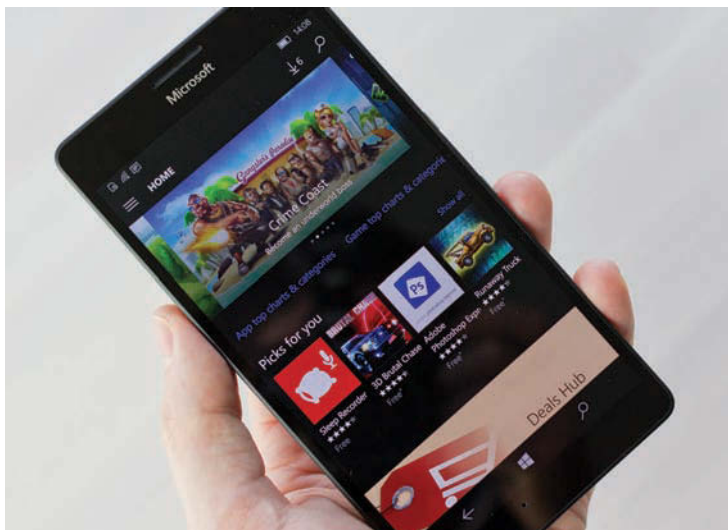
We appreciated the metal frame of the good-looking Lumia 930, with its glass front that curved so perfectly to meet the aluminium. It felt like a premium product. Unfortunately, the Lumia 950 XL doesn't give off this kind of vibe, with its flat glass front that meets a small plastic ridge and the budget-style plastic rear cover. The front is Gorilla Glass 4 instead of Gorilla Glass 3, though.

This comes off to allow access to the battery and card slots, though this isn't much of a reason for the low-grade build. For a big phone, the Lumia 950 XL is pretty slender at 8.1mm and 165g, so it's the basic design and plastic build that bothers us the most.

Microsoft has decided against offering bright colours - it's available in black and white only. Navigation buttons have been moved onscreen and the physical buttons down the side are different to those on the Lumia 950. We don't like the way the volume buttons are either side of the power button, making all three difficult to use without looking.

Hardware

At 5.7in you get an extra half inch compared to the regular model. Other aspects remain the same, so you get a Quad HD resolution (2560x1440) display, though the extra size means the pixel density is slightly lower at 518ppi compared to the Lumia 950's 564ppi. That's not a noticeable difference and it's up there with the top phablets around on the market. The AMOLED ClearBlack display also provides amazing contrast, viewing angles and colours that really pop.



As well as a bigger screen, Microsoft has reserved the Qualcomm Snapdragon 810 for the Lumia 950 XL (the 950 has the 808), so there is some more power on paper here, with eight cores and a higher clock speed of 2GHz.

There's still 3GB of memory, and although we didn't notice a dramatic difference in performance compared to the Lumia 950, the XL does feel a little bit nipper and more responsive. Like its smaller brother, there is 32GB of storage, which is double what many rivals offer. There's also a microSD card slot, so you can add up to 200GB more. Windows 10 takes up about 5.5GB of the internal storage.

A bigger phone means a bigger battery, so the Lumia 950 XL has 3340mAh of capacity. Despite the extra 340mAh compared to the regular model, Microsoft quotes 11 hours of video playback - an extra hour on the 950.

Only light users will get more than a day of use from the 950 XL, but it has a few features that will help you keep it topped up. First is a USB Type-C port, which is reversible and supports Fast Charging, while the other is Qi wireless charging support. A removable battery means you can always carry a spare if you're going to be away from mains power for a long time.

Remaining hardware is identical to that in the Lumia 950, so you get 11ac Wi-Fi, Bluetooth 4.1, NFC, GPS and 4G LTE support (Cat 6).

You also get the same 20Mp rear-facing camera - don't be fooled

by the different design around it on the back. This features a 1/2.4in sensor, f/1.9 aperture, six-lens optics and a triple-LED 'natural flash'. We also like the fact Microsoft has kept the two-stage physical camera button on the side.

We were impressed by the zero shutter lag on offer with the camera app, but the 950 XL struggles to focus sometime, which is a real pain. Quality-wise, the phone is decent and can take some really nice photos, but it's not the best on the market. The 5Mp front-facing camera is average and about what you'd expect.

The 950 XL offers a large amount of control over photography including white balance, ISO, brightness and shutter speed. Rich Capture now uses HDR to improve photos (see opposite).

Optical image stabilisation is a great feature to have for stills and video, which can be shot in up to 4K resolution at 30fps - the default setting is 1080p. Video is crisp and smooth from the OIS, but focusing is once again an issue.

Software

As with all of Microsoft's other devices, the Lumia 950 XL comes with Windows 10. The interface will, however, be familiar to anyone who has used Windows Phone. You have a Start Screen with tiles that can be moved, a drop-down notification bar with quick settings and a vertical app menu. What Windows Phone 8 users won't be familiar with are Continuum, Windows Hello and

Universal Apps. The first of these new features, Continuum, is how Windows 10 makes the most of whatever device it is on. The OS does this by allowing it to be used with a full-size desktop monitor. This can be done wirelessly, though the Microsoft Display Dock (£79) is an easier and more reliable method. The little box plugs into the phone with a USB-C cable and has various ports, including three USB ports, HDMI and DisplayPort. This means you can hook up the device to a display with a keyboard and mouse, and carry on using the phone while it's plugged in.

Universal Apps are an essential element of Windows 10. The idea is that these are the same no matter whether you're using a laptop, PC, tablet or phone. What you see depends on the size of the display, but using Outlook with the 950 XL plugged into a screen looks exactly the same as it does on the Surface Pro 4. You get a proper desktop background, the Start menu and even a PC-like taskbar across the bottom. This is a different experience to simply mirroring your phone on a larger screen.

Other Universal Apps include Maps, Messaging, Word, Excel, and Calendar, and there are more on the way. Unfortunately, these are the only apps that will work in this mode. Try and open anything else and it won't work. This isn't a problem for Windows users who are looking to boost their productivity and don't mind paying for accessories such as the Display Dock. If you want to use the device for entertainment, you can play videos stored on the phone on a larger display.

Windows Hello is a feature that allows you to log into a device with your face, or more specifically your eyes. While most manufacturers are opting for fingerprint scanners, Microsoft has decided to go down this route. We love using it on the Surface Pro 4, but on the 950 XL we found the feature a little buggy.

In a similar way to Apple's 'reachability' feature, you can hold the Windows key at any point to bring the screen down to the bottom half. This one-handed mode is useful if you find yourself unable to stretch far enough to reach something at the top. We used it mostly for bringing down the notification bar, although the navigation buttons



disappear when you do this, and you must wait for it to time out and return to normal.

Windows 10 also lets you move the keyboard for one-handed use by long pressing the space key. The operating system also comes with Cortana and options such as Glance Screen, so you can get information without unlocking the device.


There is a lot to like about Windows 10 on the Lumia 950 XL, especially if you're a loyal desktop Windows user or are looking to upgrade from an older generation Lumia. At the moment, it is still buggy in places with random exits out of apps and typing lag, so we hope Microsoft can sort it out.

Then there's the app situation. Microsoft's own work great, but the fact is developers prioritise iOS and Android above Windows. If you just want to use what's already there, then you won't have

any problems, but there are still big omissions from the Store here.

Of course, it depends on what apps you use, but big names that are missing include Snapchat, Amazon Prime Video and plenty of games. Whether the 'app gap' is a problem is a personal thing, though in our experience the quality of apps is lower than iOS and Android.

Verdict

The Lumia 950 XL is an attractive phone for those looking for Windows productivity thanks to features such as Continuum and Universal Apps. The phone itself has nothing major going for it on the design front though, and simply offers a bigger screen and slightly better processor than the regular model. Overall, we're not blown away with Windows 10 on phones with its bugs and lack of apps, but it will be a solid choice for some.  **Chris Martin**



£123 inc VAT

Contact

■ bluboo.com.cn

Specifications

5in full-HD (1920x1080, 441ppi) JDI IPS display with 2.5D Gorilla Glass 3; Android 5.1 Lollipop with Smart Wake gestures; 1.3GHz MediaTek MT6753 64-bit octa-core processor; Mali T720 GPU; 3GB LPDDR3 RAM; 32GB storage, plus microSD support up to 64GB; dual-SIM dual-standby (2x Micro-SIM); 4G LTE Cat 4, supports all three UK bands; dual-band 802.11ac Wi-Fi; Bluetooth 4.0; GPS, AGPS, GLONASS; touch-style fingerprint scanner; 13Mp, f/2.0 Sony IMX214 rear camera, dual-LED flash; 8Mp OV f/2.0 front camera; Smart Audio chip + DOX; 3050mAh non-removable lithium-polymer battery; 71x75x143mm; 151g

Build: ★★★★★

Features: ★★★★★

Performance: ★★★★★

Value: ★★★★★



SMARTPHONE

Bluboo Xtouch

The Xtouch is Bluboo's flagship smartphone, and marketed as: 'Probably the best 5in Android phone so far'. It's certainly got a fair amount of style for a budget Android phone, but we see how it fares in other areas in our Bluboo Xtouch review.

Price

It's available from various Chinese online retailers, including Geekbuying, which is currently charging £123 for the Xtouch. Bear in mind that although the site offers free worldwide shipping, when buying a phone from China you may be forced to pay import duty when it arrives in the UK.

Design

The Xtouch stands out in a sea of plain-black Android slabs with its dark blue (almost black) mirror-finish 3D rear design and visual thickness of just 5.5mm (in reality it's a still-very-slim-for-a-budget-phone 7.5mm). Bluboo has built the Xtouch around a CNC nano-moulded metal frame, which not only adds strength but a premium feel to this relatively cheap handset.

The rear finish is something you'll love or hate. We find it attractive, but less so the fingerprints to which it is prone, and its style statement is undone by the plastic SIM tray that sits on the phone's left edge (right when viewed from the rear).

This is a clever contraption, housing two Micro-SIM cards and a microSD card (up to 64GB) in a tray the same size as those used for just the two SIMs alone. It features a pin hole that can be used in the usual manner to pop out the tray, but the tray also has a ridged edge that enables you to pull it out with a fingernail. It's convenient, but its design means the tray is visible from the rear, and it just doesn't have the same premium feel as the rest of the phone.

That aside, there's little we can fault in the Xtouch's design. Bluboo has fitted a 5in full-HD IPS display that features 2.5D curved glass. Similarly curved edges at the rear make this 5in smartphone feel great in the hand, making the transition between metal and glass feel less noticeable as you run a



finger around the edge. What's more, for the money the screen is sufficiently bright and very clear, with a high pixel density of 441ppi. Viewing angles, as ever with IPS tech, are excellent, and colours are vibrant. The left- and right bezels are pleasingly slim, and the screen-to-body ratio is high in this 71x75x143mm smartphone.

Something that is a given only in Chinese smartphones at this price point is the fingerprint scanner built into the physical home button, which sits in a central position below the screen with back and options software buttons to either side. The home button is recessed (which we like, since it feels less vulnerable than those that stick out), and easily distinguished by its rim as you run a finger across the display.

The Xtouch recognises touch- rather than swipe-based input, as seen on Apple's iPhones and Samsung's more recent Galaxy smartphones. We find this works much better, and you're far more likely to take advantage of the feature as a result. A benefit of building this functionality into the home button is you can wake and unlock the screen with a single press.

Bluboo has built a Smart Audio chip into the Xtouch, and speaker grilles are found on the bottom edge rather than rear of the handset, with the result being much better audio quality than we're used to hearing from cheap Android phones. You can also take advantage of an FM radio when you plug in a pair of speakers, although none is provided.

In terms of other buttons and ports everything is where you expect to find it, with a Micro-USB charging port on the bottom, a headphone jack on the top, and power and a volume rocker high up on the right edge. Although the aforementioned SIM tray is plasticky, these buttons are metal and in keeping with the overall design.

Hardware

When Bluboo refers to its Xtouch as 'Probably the best 5in Android phone so far', we're pretty sure it is looking at the overall package - this certainly isn't the fastest Android phone we've seen, and despite the 3GB of RAM that sounds great on paper, the 1.3GHz MediaTek MTK6753 octa-core processor is by no means a powerhouse.

But the Xtouch is more than capable for daily use by most users, and few will find it sluggish with ordinary tasks. In fact, navigating menus is very quick, and the only task that took more than a second to complete was launching the Camera app.

It's worth remembering also that this is a £123 smartphone, and you're never going to find performance to match £600 flagships. That said, it's more than a rival to the OnePlus X in raw processing speed and web performance, if not graphics, and its AnTuTu 48,133-point score in our tests was a lot higher than we expected (much higher, for example, than that of the UMI Iron Pro with which it shares a matching spec).



We also ran the Bluboo Xtouch through some of our other benchmarks and recorded 2691 points in Geekbench 3.0 multi-core, 1297ms in SunSpider (using Chrome), and scores of 12- and 4fps in GFXBench 3's T-Rex and Manhattan components respectively.

Storage is fantastic at this price point, with a generous 32GB built-in and room for up to an additional 64GB via microSD card. At this price in the UK you'd be lucky to get 16GB, and would more likely be looking at 8GB. The battery is non-removable, which is a shame, but can fast charge for up to an hour's talk time in 10 minutes. Bluboo specifies a 3050mAh battery, which even for the heaviest users should be good for a full working day away from the mains.

Connectivity

The Bluboo doesn't support NFC (MediaTek's HotKnot is supported), but it has all other connectivity aspects covered. There's the latest dual-band 802.11ac Wi-Fi, Bluetooth 4.0 and GPS with GLONASS.

When buying a phone from abroad, you have to make certain it will operate on your home network. Usually we'd advise you to check our advice on how to tell whether a phone is supported by your network (tinyurl.com/onznfph), but the Xtouch supports Cat 4 4G LTE on all three bands used in the UK: 3, 7 and 20.

Even better, the Xtouch is a dual-SIM smartphone, which means you can manage two phone numbers from a single smartphone.

Cameras

Bluboo has fitted the Xtouch with a 13Mp (boosted to 16Mp), f/2.0 Sony IMX214 rear camera with a dual-LED flash, and an 8Mp OV f/2.0 selfie camera at the front. It's the same setup we saw on the UMI Iron Pro (page 36), and even the Camera app has the same basic options.

It was a windy day when we took our test shots (both UMI and Bluboo photos were taken at the same time), which makes HDR photography difficult and, as you can see below, has resulted in

some blurring, but on the whole say we'd say the Xtouch's HDR results were better than those of the UMI, and that it had a tendency to oversharpen rather than soften images.

When you zoom in on individual bricks or road signs it's clear detail is lacking, but for the money we think the camera is decent. The 8Mp front camera is also very generous at this price point.

Software

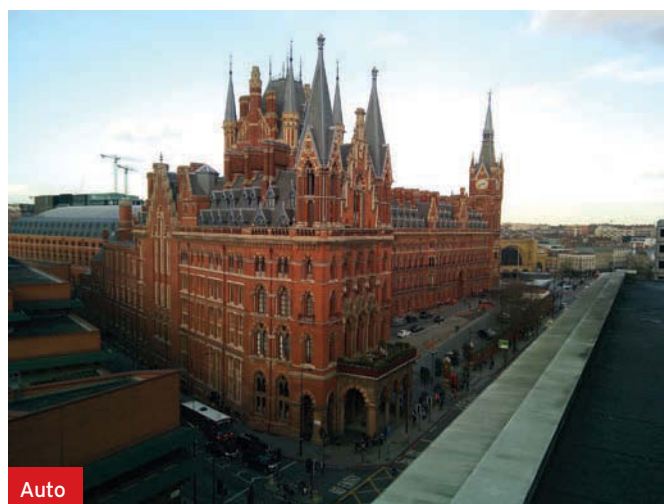
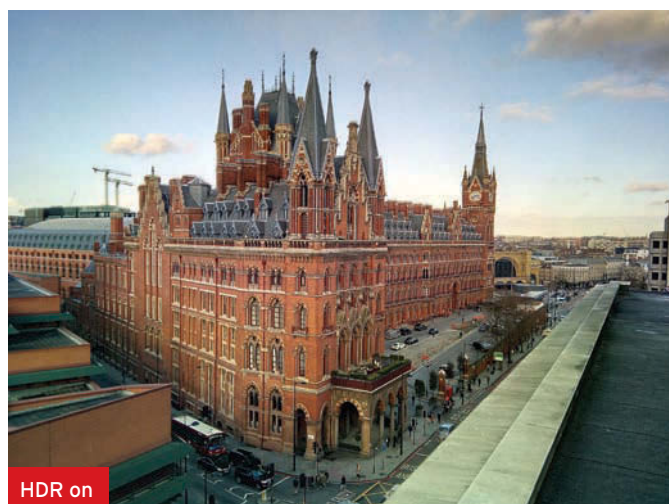
The Xtouch runs a very plain version of Android 5.1 Lollipop, and the only real differences you'll spot are the rounded shortcut icons on the home screen and the addition of several Smart Wake gestures, such as the ability to double-tap to wake the screen or draw the letter C to instantly launch the Camera app.

One change we particularly like is the continuously scrolling screens both on the home screen and in the app drawer. Right now there's little software preinstalled on the Xtouch, but if you download a lot of apps you will find this incredibly useful.

Another very useful customisation is the ability to set different LED colours for calls, messages and other notifications.

Verdict

The Bluboo Xtouch offers great value, with a strong set of specifications all round and a design that is mostly very good for a phone at this price point. Storage and connectivity are excellent, the screen decent, software just right, performance sufficient and the cameras quite acceptable. It's really rather difficult to fault for the money. **✉ Marie Brewis**



£88 inc VAT

Contact

oukitel.cc

Specifications

1GHz MediaTek MTK6735P 64-bit quad-core processor; ARM Mali-T720 MP2 400MHz dual-core GPU; Android 5.1 Lollipop; 2GB RAM; 16GB storage with microSD support (up to 32GB); 5.5in HD (1280x720) IPS OGS display with 2.5D glass; 8Mp (boosted to 13Mp) rear- and 2Mp (boosted to 5Mp) front cameras, dual-LED flash, 1080p video recording; dual-SIM dual-standby (2x Micro-SIM); supports all three UK 4G LTE bands (3, 7 and 20); Bluetooth 4.0; 802.11b/g/n Wi-Fi; GPS; OTG; HotKnot (no NFC); 6000mAh non-removable lithium-polymer battery with reverse- and fast charging; 154x77x9.9mm; 205g

Build: ★★★★★

Features: ★★★★★

Performance: ★★★★★

Value: ★★★★★



SMARTPHONE

Oukitel K6000

The K6000 is a Chinese phone that's available from various third-party vendors including Coolicool, where it costs £88.39. As we always state when buying a phone from abroad, you may need to pay import duty if it is picked up at UK customs.

Design

The Oukitel is a bit of a chunky monkey at 154x77x9.9mm and 205g, but when you consider that there's a massive 6000mAh battery inside (by comparison the Samsung Galaxy S6 houses a 2550mAh cell) you might expect it to be larger.

Understandably it feels bigger and heavier in the hand than do most Android smartphones, and we did notice its addition to a bag. But if you make heavy use of your smartphone, or would benefit from its OTG functionality (and bundled adaptor) that allows you to hook it up to and charge another smartphone, whether it's big and heavy will make little difference to you. If you're tired of having to stay close to a mains power point or carry with you a portable power bank, the Oukitel K6000 could well be the phone for you.

Oukitel claims 10 days battery life with normal usage, although it's difficult to determine exactly what is 'normal' usage. Everybody uses their phones differently. But to put it into context, the Oukitel has at least double the battery capacity of most Android phones, and with some low-power hardware and an HD screen resolution, you should squeeze more than double the battery life from it.

What's more, the Oukitel supports fast-charging, so it isn't going to take you twice as long to recharge the battery. Oukitel says you'll get two hours of talk time from a five-minute charge.

Getting past the sheer bulk of this phone, the K6000 has a nice design. It's built around a silver metal frame, with white plastic bars at the top and bottom on the rear. Built into the bottom panel is a rear-facing speaker grille, so don't expect the best audio experience from this smartphone, and at the top an 8Mp camera with dual-LED flash.

A slot-loading SIM tray sits at the top-left edge of the phone and



will accept two Micro-SIM cards or one SIM and a microSD card (up to 32GB in capacity), allowing you to boost the Oukitel's 16GB of internal storage. Even without the microSD card that's a generous amount of storage for an Android smartphone that costs less than £100 - in many cases you'd find yourself with only half this amount.

A volume rocker and power switch are found on the phone's right side, where you'd expect, while there's a Micro-USB charging port at the bottom and 3.5mm headphone jack at the top. The screen-to-body ratio is reasonably high, although there is some space below the screen for three touch-sensitive recents, home and back buttons.

The screen is usefully large at 5.5in, making this a 'phablet' device, and uses IPS technology that is known for its realistic colours and strong viewing angles. It's sufficiently bright in the scenarios we tried, and Oukitel has added 2.5D curved glass to the top that helps make the phone feel more comfortable in the hand.

The K6000's screen has 1280x720 pixels, which is an HD resolution and in line with many budget Android phones. You will find full-HD screens at this price

point, but keeping in mind that phone screens tend to place one of the largest drains on battery life it makes sense for Oukitel to stick with HD. Most users will find HD just fine, too - despite having a lower pixel density than many of its rivals at 267ppi, the screen is fine for watching video and viewing photos.

Hardware

Although this is a budget smartphone, it's clear that Oukitel had long battery life in mind throughout its design, right down to the hardware inside. While many of its rivals are specifying octa-core chips the MediaTek MTK6735P is a quad-core processor clocked at only 1GHz. The K6000 also has 2GB of RAM and ARM Mali-T720 MP2 400MHz graphics.

It's capable enough for day-to-day use, and will launch most apps reasonably quickly (the camera, for example, will take a few seconds to spring into life), but the Oukitel is by no means a speedster.

We ran the K6000 through our usual benchmarks and saw some not particularly impressive performance results in line with the likes of the cheaper UMI Fair and Vodafone Smart Speed 6. In Geekbench 3 we recorded 1336 points in the

If you're tired of having to stay close to a mains power point or carry with you a portable power bank, the K6000 could well be the phone for you



multi-core component, and 481 single-core. And in AnTuTu, also used to test overall performance, the Oukitel clocked up 24,707 points.

In SunSpider (tested in Chrome for a fair comparison), the Oukitel recorded a lowly 1768ms (lower is better in this test), and in our GFXBench graphics tests just 8fps in T-Rex and 4fps in Manhattan.

Connectivity

We've already mentioned the K6000's OTG facility that lets you use it to charge another phone. You could also use OTG to plug in a camera, hard drive or other USB-connected device.

And we briefly touched on its dual-SIM functionality. The Oukitel is a good choice if you want to manage two phone numbers from one smartphone, with dual-SIM dual-standby facility.

This dual-SIM functionality is one of the perks of buying a phone from China; another is that unlike the aforementioned Vodafone Smart Speed 6 it is network-unlocked (or SIM-free). You must be careful

when buying a phone from abroad that it will work on your operator's network. Fortunately, the K6000 supports all three UK 4G LTE bands, 3, 7 and 20.

In terms of connectivity the Oukitel is a standard budget Android, with support for 802.11b/g/n 2.4GHz Wi-Fi, Bluetooth 4.0 and GPS. There's no NFC but there is HotKnot, which is MediaTek's 'sort-of' equivalent and works only with other HotKnot devices.

Cameras

The K6000 is fitted with an 8Mp camera at the rear that uses software to increase it to 13Mp; likewise, at the front there's a 2Mp camera that boosts to 5Mp. Oukitel has specified a dual-LED flash, and the primary camera can also shoot 1080p video.

The camera app is reasonably basic, with the usual shooting modes and options for turning on voice capture, face detection, smile shot, boost mode and the like.

Our test shots were acceptable for a budget camera, but detail is

lacking. HDR mode is useful for tackling problem areas where the photos are overexposed, but can result in slightly cold images.


Software

The K6000 runs on a modified version of Android 5.1 Lollipop. The most obvious change is that there is no app tray - all the app shortcuts sit on one of three home screens, in a much more iOS-like setup. The icons are also rounded and some of the images are different - it might take you a little while to get used to the new icons for the Google Play store and the like.

The K6000 also supports customisable Smart Wake gestures, such as the ability to draw the letter C on the screen in standby to open contacts (or the camera or any other app you like). Other gestures include the ability to take three-finger screenshots, adjust the volume, launch the camera and more.

A Float Gesture is also supported that places a small grey circle anywhere you like onscreen. When you tap and hold it you can find quick-access options including Game mode, which locks the menu and back keys while you're playing games, a lock screen option, options to pop up video or music onscreen, a read mode and a task killer.

Verdict

The K6000 is big and heavy, which is necessary to support the massive 6000mAh battery. Battery life has been kept in mind throughout the entire design process, which means performance is nothing to shout about. But if you need a large-screen phone that keeps on going, then this is great value.  **Marie Brewis**



HDR off



HDR on

£104 inc VAT

Contact

■ elephone.cc

Specifications

5.5in full-HD (1920x1080, 400ppi) IPS display; 1.3GHz MediaTek MT6753 64-bit octa-core processor; ARM Mali T720 450MHz GPU; ELE UI, based on Android 5.1 Lollipop; 3GB RAM; 32GB storage, plus microSD support up to 128GB; dual-SIM, dual-standby (2x Micro-SIM), supports all three UK 4G LTE bands (3, 7 & 20); 802.11b/g/n Wi-Fi; Bluetooth 4.0; GPS; touch-style fingerprint scanner; 13Mp, f/2.0 Sony IMX214 rear camera with LED flash, 1080p video recording; 5Mp front camera; 2600mAh non-removable lithium-polymer battery, charges over Micro-USB; 77x155x7.35mm; 165g

Build: ★★★★★

Features: ★★★★★

Performance: ★★★★★

Value: ★★★★★



SMARTPHONE

Elephone M2

If you're looking for a cheap Android phone, buying from China can get you much more phone for your money. The Elephone M2 is one such example, and at £104.53 from Elephone Store it's unlikely you'd find the same deal on the UK high street. The price includes free worldwide shipping, but one thing you have to watch when shipping it to the UK is that if your parcel is picked up at customs you will have to pay import duty. Plus there are some other risks involved when you buy from abroad, such as the ease with which you can return a handset if something goes wrong.

Design

For a circa-£100 phone, the Elephone looks much better than what you might get for the same money in the UK. For a start it's not plastic, and this metal-framed phone features a smart unibody design that adds rigidity. That does mean the 2600mAh battery is non-removable, but a tray on the phone's right edge lets you add a microSD card or a second SIM.

The build is entirely metal, save for the glass display and two black plastic panels that sit top and bottom at the rear. These tend to be used to improve the cellular signal with metal smartphones, and we didn't find they detracted from the design. However, on our review sample the bottom panel doesn't run quite flush to the metal, which results in a slightly less premium feel than Elephone presumably wanted to achieve.

In other respects the build quality is good. Our 'black' model is more a gunmetal grey, and a gold version is also available. Despite being a phablet, the M2 isn't overly large or unwieldy, measuring 75x155x7.35mm (pretty thin for a budget phone) and weighing in at 165g. We also like the 2.5D curved glass used on the phone's front, which makes the transition between the metal frame and glass screen feel less noticeable in the hand.

In our tests the 5.5in full-HD IPS display was sufficiently bright and clear, with a pixel pitch of 400ppi. Viewing angles are excellent and colours are good. If you're looking for a mobile display



on which to watch video, this one won't disappoint.

The bezels to the left- and right edges of the screen are reasonably slim, though a fair amount of space is found top and bottom. This is partly used to house the camera, speaker and sensors at the top, and back and recent touch buttons at the bottom, which sit either side of a physical home button with a fingerprint scanner built-in.

Now that's something you won't find in a £100 UK phone. This type of biometric security is still only as secure as your password or PIN, since either can be used to bypass the fingerprint scanner, but when it works well it can be a convenient way to quickly unlock your handset without having to tap in a code.

Pleasingly, the fingerprint scanner works with a touch- rather than swipe-style input method, although you do need to ensure you cover the entire home button with your thumb- or fingertip. Elephone says it works in half a second, and in our tests we found no reason to question this.

So many of the Chinese phones we review reverse the Micro-USB charging slot and headphone jack, with the former at the top and the latter at the bottom. Elephone doesn't do this, which

is nice, although it does stick the volume rocker and power button high up on the phone's left edge. It's something you'll get used to, especially so if you're a leftie, but it could be a pain if you plan to use the smartphone with a flip case.

Another thing we like is the bottom-mounted speaker grilles - when placed at the rear these can fire sound into your palm or on to a desk and muffle the audio.

Performance

On paper you might think the M2 to be a beast in the performance stakes, given that it boasts an octa-core processor and whopping 3GB of RAM. The MediaTek MT6753 64-bit chip clocked at 1.3GHz and 450MHz ARM Mali T720 GPU won't offer flagship-level performance, but it does compare very well to the budget competition.

We ran the Elephone through our usual benchmarks and found faster performance than any UK circa-£100 phone, although it was beaten by Chinese phones such as the UMI eMax and Ulefone BeTouch. We recorded 2718 points in the multi-core component of Geekbench 3 (625 single-core), which compares favourably to the 2469 of the Vodafone Smart Ultra 6 sitting at the top of our budget phones chart.

Viewing angles are excellent and colours are good. If you're looking for a mobile display on which to watch video, this one won't disappoint

In AnTuTu, the M2 recorded 38,921, which is by no means awful and certainly faster than the likes of the Ulefone Paris and UMI Iron.

Its 1312ms result in SunSpider (tested in Chrome for a fair comparison) is about right for a budget Android phone, as is its scores of 12- and 4fps in the T-Rex and Manhattan parts of the GFXBench graphics test.

We're more enthused about the amount of storage you get with the Elephone. Whereas many UK budget phones come with just 8GB (and 16GB if you're really lucky), the M2 has 32GB. And if you don't want to take advantage of its dual-SIM functionality then you can boost this with a microSD card.

In terms of runtime, we wouldn't expect more than a day from the 2600mAh non-removable battery, but you may get more depending on how you use the Elephone M2.

Connectivity

A key reason for buying a phone from China (aside from the better value for money) is that most models are dual-SIM, which lets you manage two phone numbers from one device - handy if you want to carry one handset for work and pleasure, or you want to carry a different SIM for use abroad, or perhaps you get a better rate for calls and minutes on one network, but get free data on another.

The M2 is a dual-SIM, dual-standby model. When deciding whether to buy the Elephone over a UK phone such as the Vodafone Smart Ultra 6, keep in mind that this device is network-unlocked, meaning it will run on any network with which it is

compatible and not only Vodafone. You should always check the frequency bands supported by a phone before you buy to ensure it is compatible with your operator's network. Fortunately the Elephone supports all three 4G LTE bands used in the UK, 3, 7 and 20.

In other respects the M2 offers the same standard connectivity specs you'd expect from any budget Android phone, including 802.11b/g/n Wi-Fi, Bluetooth 4.0 and GPS. There's no NFC, but you do get HotKnot, which is MediaTek's 'sort-of' equivalent, but only really useful if someone you know also has a smartphone based on a MediaTek processor.

Cameras

The M2 is fitted with a 13Mp Sony IMX214 camera with LED flash at the rear, which is also capable of recording 1080p video, plus a 5Mp selfie camera. The Camera app is nothing fancy, you get the standard picture modes and filters, plus options to turn on Gesture shot, smile shot, anti-shake and the like.

For a budget smartphone the results are quite acceptable, but as we found you'll probably want to leave HDR switched on at all times (you can see our test shots with and then without HDR below).

Zoomed in to actual size, it's clear that a lot of detail has been lost, particularly when you attempt to examine individual bricks or text. However, the HDR image isn't bad at this price point, with realistic colours on the whole.

Software


The M2 runs the ELE UI, which is based on Android 5.1 Lollipop.



The only additional app is an Elephone Service app that lets you send feedback to the company, and to our eyes ELE UI is very much standard Lollipop, but with a couple of extras in the form of App Permissions (not introduced in Android until Marshmallow) and Smart Wake features.

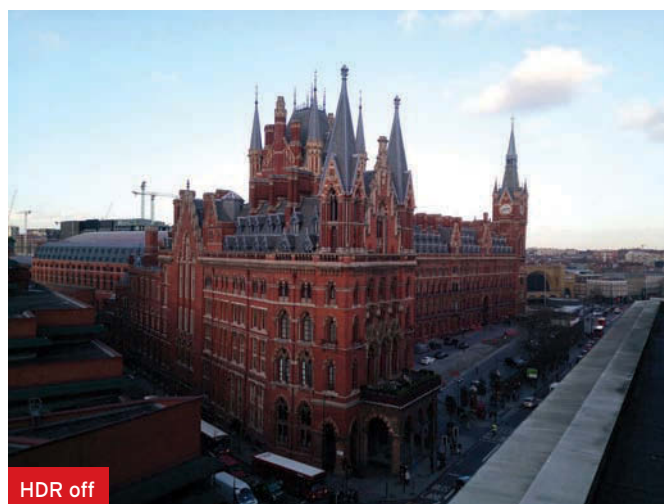
By turning on Smart Wake gestures you can quickly launch various apps from screen-off by drawing a character onscreen, although these actions aren't customisable as they are with some Chinese phones we've seen. You can also double-tap the screen to wake it, although if you're using the fingerprint scanner you'll find pressing the home button has the same effect.

Verdict

If you're happy to buy from China then the metal Elephone M2 offers much better value than what you'd get for the same money in the UK, with a 5.5in full-HD screen, generous 32GB of storage, dual-SIM functionality and a fingerprint scanner. Performance is decent at this price, and the cameras are more than acceptable. A good budget buy.  **Marie Brewis**



HDR on



HDR off

£118 inc VAT**Contact**■ mi.com/en**Specifications**

5.5in full-HD (1920x1080, 403ppi) display; Android 5.0 Lollipop with MIUI 7; 2GHz MediaTek MT6795 Helio X10 64-bit octa-core processor; PowerVR Rogue G6200 GPU; 2GB LPDDR3 RAM; 16GB storage (32GB option available); 802.11ac Wi-Fi; IR Blaster; GPS, A-GPS; GLONASS; Bluetooth 4.1; Dual-SIM dual-standby (2x Micro-SIM); 4G LTE support for bands 3 and 7, not 20 (800MHz, used by O2) on both SIMs; fingerprint scanner (0.3s); 13Mp, f/2.2 rear camera with two-tone LED flash; 5Mp, f/2.0 front camera with smart beauty profiles; 4000mAh non-removable battery, charges over Micro-USB; 150x76x8.65mm; 164g

Build: ★★★★★

Features: ★★★★★

Performance: ★★★★★

Value: ★★★★★



SMARTPHONE

Xiaomi Redmi Note 3

Xiaomi's phones aren't officially sold in the UK, but while the brand may not be well known to us Brits, it's bigger than Apple and Samsung in China. Redmi is the company's budget smartphone line-up, and the Note 3 sits at the top of the series as an all-metal Android phablet with a fantastic design and decent performance.

Our review sample came from GearBest, and is the gold model with 16GB of storage and 2GB of RAM. This Note 3 costs £118.27 with free worldwide shipping, although you may have to pay import duty.

Design

Wow. That's what every member of the *PC Advisor* editorial team said when we took the Redmi Note 3 out of its box. We've been waiting to get our hands on a Xiaomi phone for ages, and following the disappointment that was the Mi 4C the Note 3 had a lot of making up to do. Fortunately, it didn't let us down.

While it has some of the markings of a budget Android phone - it's on the chunky side at 8.65mm, plus there's the rear-mounted speaker and now outdated Micro-USB port - it looks good enough to take on the iPhone in the design stakes. It's certainly the best-looking budget Android we've ever seen.

Despite housing both a large 5.5in screen and a high-capacity battery (apparently achieved using a 690Wh/L high-density cell), this Xiaomi phablet feels fantastic in the hand. It's reassuringly weighty without being heavy at 164g (only 4g more than the plastic Note 2), and rounded edges on the rear make it feel smaller than it is. As with the Mi 4C there's also an easily accessible one-handed mode that lets you shrink down the contents of the screen to 4.5-, 4- or even 3.5in.

The gold metal shell is sandblasted to a smooth-to-the-touch but matt-effect finish. This contrasts nicely with the shiny polished edging seen around the screen, fingerprint scanner, camera and flash, and even the shiny Mi logo on the rear. It really is a premium-looking smartphone.

The fingerprint scanner mounted on the rear is perfectly positioned in terms of how you hold your phone.



Usefully, it can wake and unlock the screen with a single touch, and Xiaomi's claims of it recognising your fingerprint in 0.3 seconds rang true in our tests.

A full-HD screen is still not something you can reasonably expect to find in a smartphone of this price, and at 5.5in the 1920x1080 resolution equates to a crystal clear 403ppi. The screen is bright with realistic colours and great viewing angles, making the Note 3 an ideal mobile device on which to enjoy video. To get exactly the display you want, you can switch between warm, standard and cool screen colours, and choose between standard, automatic and increased contrast. The Note 3 also supports Sunlight display, making it easier to view in direct sunlight, plus a Reading mode.

Although the Xiaomi's bezels are slim, a thin black border is evident around the edge of the screen; we like the effect it creates. In the Settings menu, you can change the wallpaper and themes, text size and font. Also here are options to change the colour of the LED for notifications, calls and texts, and the long-press function of each of the three Android-standard buttons below the screen.

Ports and connectors are where you would expect to find them, with a metal power button and volume rocker on the Note 3's right edge, and a pin-operated slot-loading dual-SIM tray on the left

(this accepts two Micro-SIMs, and both can connect to 4G). There's a headphone jack and IR blaster at the top of the Xiaomi, and a Micro-USB charging port on the bottom.

Performance

For a budget smartphone, the Note 3 has some decent hardware, and even the 2GB of RAM version turned in very good performance in our benchmarks. Everything seems fast on this phone, which will be partly down to the software, and partly the hardware. Xiaomi has specified a 2GHz MediaTek MT6795 Helio X10 64-bit octa-core processor, PowerVR Rogue G6200 GPU and 2GB of LPDDR3 RAM. There's also 16GB of internal storage (but no support for microSD so you might prefer the 32GB option), and a huge-capacity 4000mAh non-removable battery that is charged over Micro-USB.

The Xiaomi supports Performance and Balanced operation modes; we ran it in Performance mode for the sake of our benchmarks, although Balanced will provide longer runtime. Even so, we got a good two days use out of the Note 3 in Performance mode.

The Xiaomi's most-impressive performance results in our benchmarks came in Geekbench 3.0, which is used to measure overall processing performance. The Note 3's score of 4597 points in the multi-core component has been beaten only by the Samsung Galaxy Note 5 and Galaxy S6 Edge.

In AnTuTu, which is also used to measure overall performance, the Note 3's 46,924 points ranked lower in comparison to other high-end Android smartphones, but are nonetheless very impressive for a phone at this price point.

That's also true of the SunSpider measurement of 907ms (tested in Chrome) - not the best we've seen but brilliant for a budget Android.

In GFXBench 3, used to test graphics, the Xiaomi began to show it wasn't in the same class as the flagships but, again, scores of 22fps in T-Rex and 8fps in Manhattan are very good for the money.

Connectivity

The Xiaomi Redmi Note 3 will work on all UK networks, but for 4G it isn't compatible with 800MHz/Band 20. This means customers using O2's network, or those that use its network such as giffgaff, won't be able to use 4G data.

If you can benefit from its 4G connectivity, you'll be pleased to learn that 4G is operational on both of its two Micro-SIM slots, although this is a dual-standby phone.

Other connectivity options are very well catered for, with the latest 802.11ac Wi-Fi, GPS with GLONASS, Bluetooth 4.1 and an IR blaster. The only thing that's missing is NFC.

Cameras

Like just about every other budget Chinese phone we've seen the Note 3 is fitted with a 13Mp, f/2.2 rear camera and 5Mp, f/2.0 front camera. There's a two-tone flash on the back, plus a selection of modes and real-time filters.

As you'd expect at this price point, detail is a little soft at full-size, and we found colours to be very warm, but the overall result is acceptable and certainly better than what we saw from the Mi 4C - you don't get the same odd banding effect here. There are options in the camera settings to adjust contrast, saturation and sharpness, and you can use the volume button to trigger the shutter. However, the Note 3 doesn't feature the Edge Tap function found in the Mi 4C.

Software

Out of the box the Xiaomi Redmi Note 3 as supplied by GearBest isn't the easiest phone to use for UK users. Running MIUI 7, which

is based on Android 5.0 Lollipop, there's no Google Play store or any Google apps, and many of the preinstalled apps are in Chinese. The keyboard is also Chinese, and even when you switch its input to English you still see a lot of Chinese language popping up.

In order to solve these issues, we sideloaded the Google Installer app (available from tinyurl.com/py6bfmr), and used this to install the Google Play Store, Gmail and other Google apps. We then installed the Google Keyboard, which we downloaded from Google Play, and uninstalled the preinstalled Chinese apps (tap and hold their icons, drag them to the bin icon and tap Uninstall).

At this point, the Redmi Note 3 resembled any other UK Android phone, but we did find the occasional app that Google Play reported as being incompatible, for example AnTuTu 3DBench. These apps can be sideloaded - all you need is the APK file. You can do a Google search and download these from other sites hosting them, or install the APK Downloader Chrome extension and download them from Google Play yourself.

Of course it is possible to use the apps preinstalled on the Xiaomi Redmi Note 3 and use the phone with a Mi- rather than Google account, but we did find language to be a barrier here. The preinstalled apps also gobble up a fair amount of storage, and we had just under 10GB of the phone's 16GB free once we had installed our Google and benchmarking apps.

In common with iOS there's no app tray, so everything is placed on the home screen. You can group apps into folders by dragging and dropping them on top of each other.

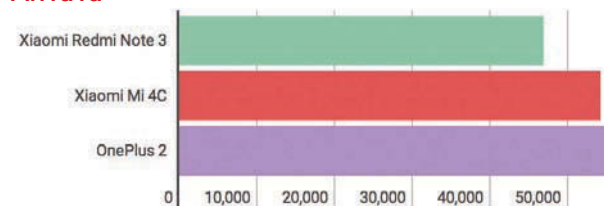
The pull-down notification bar has also been tweaked. When you drag down from the top of the screen you'll first see notifications, and must swipe in from the right to access quick settings and a shortcut to the Settings menu.

A pinch on the home screen brings up options to move apps, add widgets and alter the wallpaper and effects (the transitions as you move between home screens).

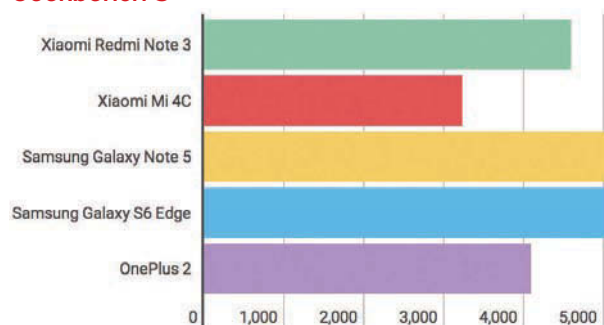
Verdict

The Redmi Note 3 may not be best suited to UK users out of the box, but with some setup tweaks it is an

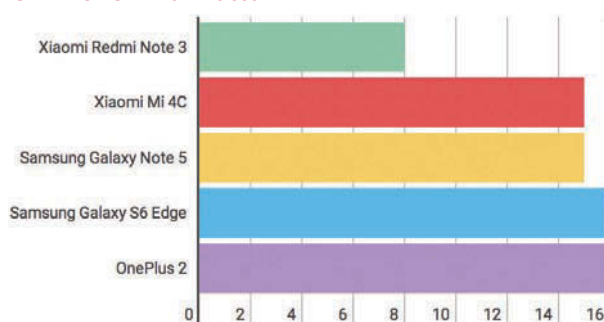
AnTuTu



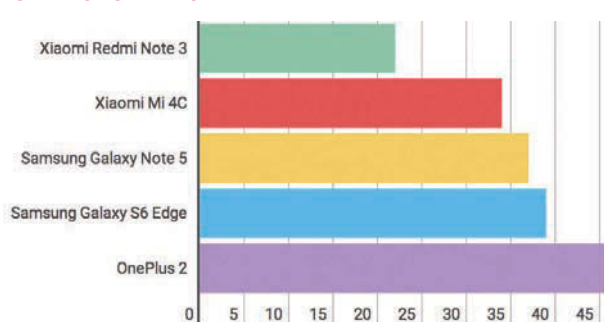
Geekbench 3



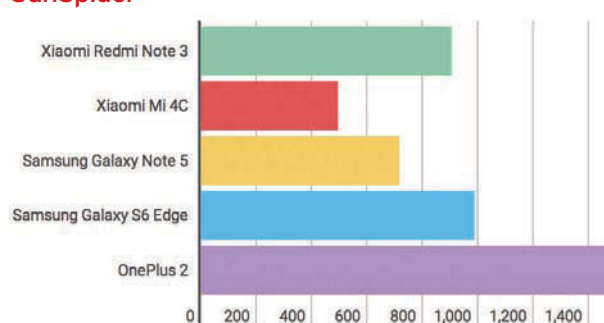
GFXBench Manhattan



GFXBench T-Rex



SunSpider*



* lower is better

excellent budget Android phone with a fantastic design and performance for the price. **Marie Brewis**

£249 inc VAT

Contact

■ samsung.com/uk

Specifications

Wi-Fi, Bluetooth and NFC connectivity; Circular watch face; 1.2in 360x360 AMOLED display; Heart rate monitor; 1GHz Exynos 3250; 512MB RAM; 4GB storage; 250mAh battery; IP68 resistance rating; Circular UI; 42.3x49.8x11.4mm; 47g

Build: ★★★★★

Features: ★★★★★

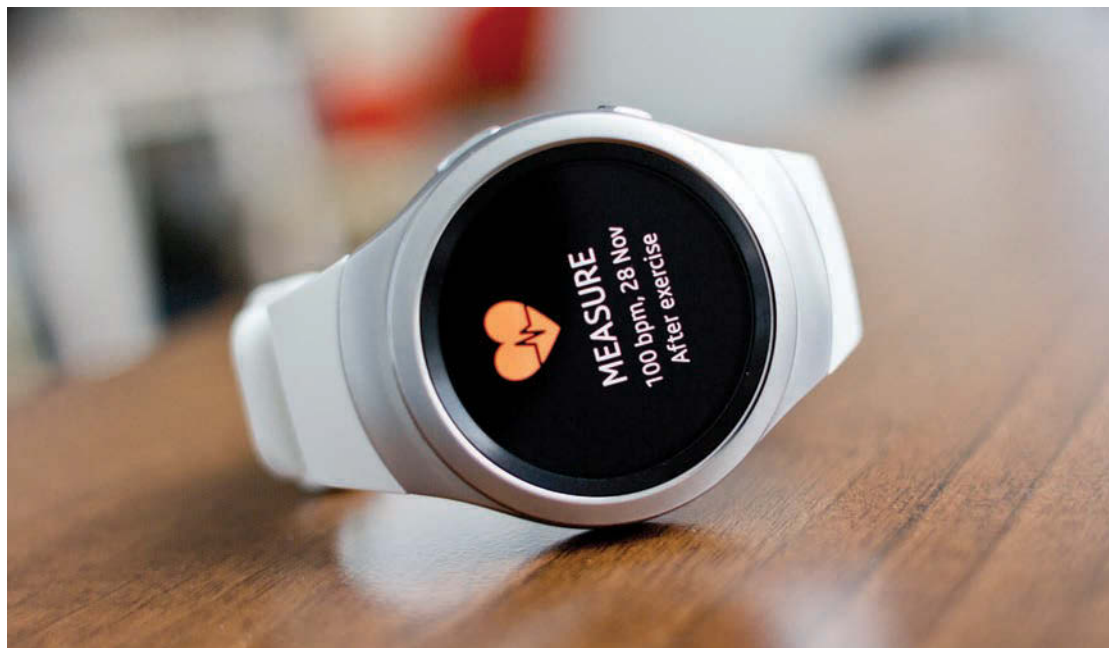
Performance: ★★★★★

Value: ★★★★★



SMARTWATCH

Samsung Gear S2



Samsung's latest smartwatch is available in two versions - the Gear S2 and the Gear S2 Classic (£299). We got our hands on the standard model, which comes in both silver and a slightly darker grey.

On the wrist, the Gear S2 is lightweight and comfortable to wear. In fact, its weight and general build make it feel like a premium product.

The real beauty of the design comes not from the circular display, but the watch's bezel. Instead of directly interacting with the Gear S2 via the screen, users have the option of rotating the bezel to scroll through the device's various menus and apps. When you turn

the bezel, you'll feel a gentle click, which Samsung says will allow for muscle memory to eventually kick in and enable you to select apps without needing to look at the screen, although after using the watch for two weeks we still couldn't manage it. It's not a click generated by a vibration motor either, it's mechanical. This means there's no drain on the battery for those of you that just love the traditional watch sensation of turning the bezel. You can, of course, still swipe directly on the watch face, but this isn't how Samsung intends the Gear S2 to be used. We did, however, find using the bezel

a little confusing when navigating the new circular UX, especially at first - more on this later.

Samsung includes Android-style back and home buttons on the side of the smartwatch to make using it an easier process, though we found this fiddly. There's also no indication as to which button is which.

Hardware

The Gear S2 has a 1.2in AMOLED display, with a resolution of 360x360 and a pixel density of 301ppi. It's protected by Gorilla Glass 3, which is standard for current smartwatches and should help protect it from scratches and general use.

Inside is a 1GHz Exynos 3250 processor, coupled with 512MB of RAM along with 4GB of onboard storage. During testing we found the watch to be responsive and didn't encounter any lag. It also has an IP68 rating, which means its dust- and water resistant, and will survive being caught in the rain.

The watch also comes with Bluetooth, NFC and Wi-Fi capabilities. Wi-Fi connectivity is especially impressive as it allows you to use the smartwatch when not connected to your phone.

Samsung includes a host of sensors to allow the Gear S2 to track your activity throughout the day, and present it to you in a watch-style layout. Instead of just measuring



calories, it follows the amount of activity you've done throughout the day and presents it to you in blocks - green areas represent when you were active, yellow for when you've taken it easy, and grey areas for when you've not moved at all.

It's a good way to motivate yourself to get fit, though we found that it wasn't always accurate. On a handful of occasions, while we were sitting at our desks, the watch counted this as 'light activity'. If you haven't been active for a while, you'll get a little nudge to encourage you to get moving. You can also monitor your exercises with only a few taps, and we found it to be more accurate than its general tracking abilities.

The Gear S2 has a 250mAh battery, which Samsung claims should last around two- to three days on a single charge, when using the built-in battery saving mode. With this turned off, you can expect a similar battery life to that of the Apple Watch, which gets you through the day and night without issue, but will usually run out of power at some point during the second day.

Software

Samsung uses its own custom circular UX with the Gear S2, which works well with the hardware and overall design. The watch is easy to use, although there is a steep learning curve to master what the buttons can do, and which way to turn the bezel. Turn the bezel clockwise to scroll through your widgets, which you can then customise to suit your needs.

Turning the bezel anticlockwise will display your notifications, while pressing one of the buttons on the side will display all installed apps on the watch. Simple, but as we say, it took a while to get used to.

The initial setup process is straightforward. First, install the Samsung Gear app on your Android device. You'll then be prompted to install two more apps from Google Play in order for your phone to communicate with the watch. Once you've gone through the setup process, the Gear app is the control centre for everything you do with the watch. It allows you to customise the layout of other apps on your Gear S2, the watch face and other settings. It's also where you can look for other apps to install on the




watch, although we noticed almost every one we added required a full phone app to operate properly. While this isn't any different from the likes of the Apple Watch and its companion apps, it's frustrating having to download the app.

Samsung is working hard with companies in various sectors (retail, social media, and so on) to make sure that the apps running on the Gear S2 perform to their full potential. Take the CNN app as a prime example - with other smartwatches, you're able to see headlines of CNN stories but not much else. However, with the Gear S2, you can tap on an interesting article and read it in its entirety, directly from the smartwatch.

iOS users can also get in on the action, though many of the features mentioned here won't be available to them. Connecting an iPhone to the Gear S2 will provide notifications and limited fitness monitoring, but not much else. We therefore wouldn't advise iOS users to buy this smartwatch - the Apple Watch costs just £50 more and offers greater functionality for iOS users.

Verdict

The Gear S2 is a sleek and attractive smartwatch. It offers standard features such as fitness tracking, but also includes some interesting extras, including a rotating bezel for navigating the UI, and enhanced app capabilities.  **Lewis Painter**



£449 inc VAT

Contact

dxo.com/uk

Specifications

1in 20.2Mp sensor; f/1.8 lens; Raw capture; ISO 100 to 12800; shutter speed 1/8000 to 15s; semi- and full manual modes; 1080p video capture; built-in battery; Lightning connector; requires iPhone 5 or later; 67.5x48.85x26.25mm; 108g

Build: ★★★★★
Features: ★★★★★
Performance: ★★★★★
Value: ★★★★★



DIGITAL CAMERA

DxO One



The DxO One is the first truly new concept in camera design since, well, smartphone cameras got good enough to take photos someone else might want to see. It's also a Marmite product - there are many reasons to hate it, but if what it does appeals, you're going to absolutely love it.

At first glance, the DxO One is a cigarette packet-sized, grey-and-black lump of indeterminate purpose that sits in your hand weighing about the same as your smartphone. Pull down on a panel on one side and it begins to reveal itself. Slide two-thirds of the way down and a slightly-inset lens is revealed.

A quick tug further down makes a Lightning connector pop out for plugging into your iPhone.

On the opposite side from the lens is a small LCD screen that provides basic info in use - which shooting mode you're in and how many shots are left, for example (or your settings in manual mode).

Lightning connector back in (which involved pulling down on the panel again, pushing it in then releasing the panel again).

Shooting with the DxO One

Using the DxO One is a wonderfully fun and easy experience - at least when you get used to it. Detached

A lot of thought has clearly gone into the design of the DxO One app - design thinking at a level you'd usually associate with Apple itself

There's also a latch hiding a microSD slot for storage cards and a Micro-USB port for charging. On the top is a big shutter button - and that's it. The rest of the DxO One's features are controlled from your iPhone.

Before you can get started with the DxO One, you have to download an identically named app from the Apple App Store. The DxO One doesn't work with Apple's own Camera app - which is hardly surprising considering the quality and level of control DxO's camera offers.

A lot of thought has clearly gone into the design of the DxO One app - design thinking at a level you'd usually associate with Apple itself. Load the app for the first time and it provides a video tutorial on how to open up and connect the hardware to your phone. More importantly, when you disconnect the device, another video tells you how to quickly and safely pop the

from your iPhone, it slips easily into your jeans pocket. When you want to take a shot, get it out, pop out the connector, plug the camera into your iPhone, load the app and shoot.

Holding your phone and the DxO One too shoot feels a bit weird to begin with. The two parts never quite feel connected, so you have to learn where to put your hands to be able to hold the two together - as if you just hold one you worry that the connector might snap and you'll drop one - and tap or swipe at the controls.

For the first few days, you're wondering why you can't buy a case to hold your phone and the DxO One together. Soon, though, you get used to it and realise that any case would nullify the camera's main merits - how easy it is to carry around with you and how quickly you can shoot with it. Or you hate it and return it.

The Lightning connector between the DxO One and your



iPhone can swivel, so you can take shots over the heads of people at gigs or whatever. DxO would have been better off ditching the ability to swivel and having an recessed channel that the whole of the bottom of your phone slides into when you plug your phone and DxO One together for a firmer feeling connection.

A mighty, fixed lens

The 11.9mm, f/1.8 lens is exceptional for its size, and behind it is a one-inch sensor - the same as you get on full-on cameras that cost around the same as the DxO One, like Sony's RX100 III. The sensor captures 20Mp images, saving Raw images (or JPEGs) to your microSD card and - unless you tell it not to - a JPEG to your iPhone for quick sharing on social media (an advantage over most cameras).

Even on full auto the results are (usually) noticeably better than even an iPhone 6s, especially in poor conditions. We first tried out the DxO One at a Halloween party (left) and were really pleased with how the shots came out both outside at night and downstairs in a basement bar. However, after a few drinks the lack of image stabilisation - which the iPhone has - became apparent.

And shooting Raw, we could further improve the shots at home in a way that's just not possible with Apple's Camera and Photos.

Some people are going to be put off by the lack of a zoom lens, but that's a sacrifice inherent in the DxO One's core concept. We're fans of fixed lens cameras and - from snapping on our phones - most of us are comfortable with moving around and contorting ourselves to get the right shot.

Your phone's big screen - compared to most cameras - makes framing photos incredibly easy. You also use your camera's screen to access the DxO One's controls. You can swipe across the

screen on the back of the DxO One to change from photos to video - as you can shoot both without attaching it to your phone, but you're essentially shooting blind and we never found a reason to do so - but everything else is reached via buttons and controls down the left and right of what turns out to be a rather brilliantly designed app.

On the right are four big, thumb-sized buttons (see right) to trigger pop-out menus for capture format (more on that later), a timer, flash and shooting modes.

The modes give you a full set of semi-manual and manual controls. The first set are four standard 'scene modes': Sports, Portrait, Landscape and Night. We didn't find much use for these as full Auto produced the right results 99 percent of the time - and we found it delivered better often results in low-light conditions than Night mode, which could come out underexposed (very dark). You can rescue these in Lightroom, but that's no good if you want to quickly share them too.

More useful are the semi-manual modes: Program AE, Shutter Priority, Aperture Priority. Beyond this a full manual mode.

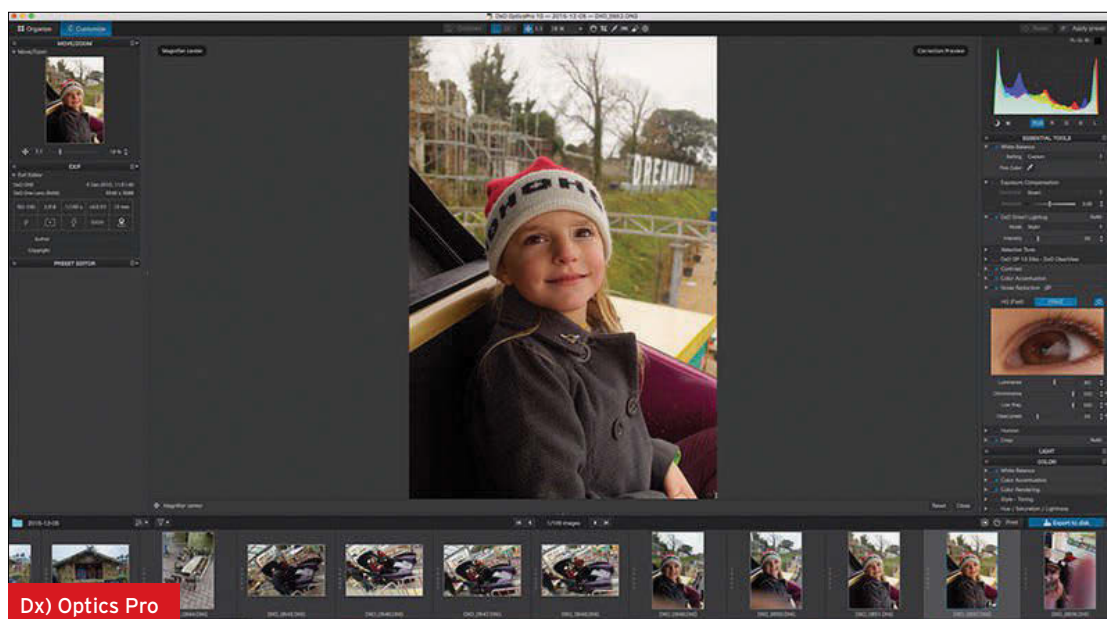
Adjusting these is very easy. On the left is a vertical set of controls to swipe up-and-down and select. Tapping on one of these - such as ISO or focus - brings up a second swipeable surface next to it to adjust the control itself.

This makes changing the setting quickly intuitive and therefore fast, and there are handy icons at each end of the surface to show what the adjustments do (for example, larger and smaller apertures or a running person vs a portrait for shutter speed). As well as helping you 'read' the interface more quickly, they're helpful for less experienced photographers to help them understand what these controls do inside the camera hardware.



In the semi-manual modes, you can see the results of adjusting the exposure controls onscreen. In full-manual you have a meter to tell you if you're under- or over-exposing your images (and by how much).





DxO Optics Pro

The DxO One camera app is probably the best camera app we've ever used. No touchscreen interface - no matter how slick or intuitive - can compete with the proper buttons and dials of digital SLR, as with practice you can adjust them without taking your eyes off what you're shooting. But this really is the next best thing.

You can capture images in three formats: JPEG, Raw or 'Super Raw'. In Super Raw mode, the DxO One takes four shots in quick succession, saves them as one file and then uses the processing power of your computer to combine them in a way that eliminates a lot of noise. From the evening onwards, we found that photos taken in Super Raw mode were less noisy,

but we still avoided using the mode unless really necessary as Super Raw images can't be imported directly into Adobe Lightroom or Photoshop (or Apple's own Photos software) - you have to bring them in via DxO's own Optics Pro software (which is available for Mac and Windows).

You get a free copy of DxO Optics Pro with the DxO One - plus the DxO Connect import app and the DxO Film Pack 'film looks' plugin for Optics Pro, Photoshop and Lightroom. This is good value - they'd set you back £100 on your own - as long as you don't already use something like Lightroom.

Optics Pro features some truly excellent photography tech - especially if you're less experienced with photo editing or just generally in a hurry, as the automated tools like Smart Lighting and ClearView image produce great results with minimal input from you. However, it feels slow and the interface is a bit clunky next to Lightroom.

The fixed lens isn't the only compromise that DxO has made to get the One so small. There's no flash, so you're stuck with the iPhone's built-in one. However, the DxO One uses a longer flash than the iPhone's standard one, which we found gave more pleasing results.

The battery life is also a lot less than you'd expect from a full-sized camera or your phone. You can be confident of the DxO making it through a full day or evening event - but perhaps not from an 11 am wedding to the end of the reception.

However, it charges over USB, so you can top it up using the same power bank you use for your phone.

Power comes at a price

The main thing that might put you off buying the DxO One is the price. For £450, you could buy an entry-level digital SLR like the Nikon D5300 or a decent interchangeable lens camera like Fuji's X-T10 (both with a single lens). But with the DxO One, you're not buying a 'proper' camera - you're buying convenience.

What we most liked about the DxO One was that we could take really good shots at places where we'd never take a digital SLR, but for which our phone's camera would deliver less appealing results: parties, private views, weddings, theme parks, anything last minute (because we've generally got it in my coat pocket), anything involving our kids (because we've got enough to carry, thank-you-very-much) - you know, the properly fun stuff in life. We can then quickly Facebook or Tweet a couple of photos for the here-and-now, and edit the Raw files back at home for something more memorable - though we wish we could edit Super Raw in Lightroom with having to take it through Optics Pro first.

Verdict

Is that convenience worth £450 to you? If so, buy a DxO One. If not, upgrade your phone or buy a digital SLR. It's one of the wonders of modern tech. Neil Bennett

DxO Optics Pro's noise reduction is excellent. This crop shows how it's essentially rescued the photo on the left to produce that on the right



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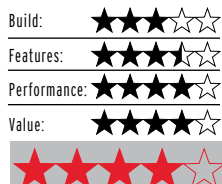
£190 inc VAT

Contact

■ synology.com/en-uk

Specifications

1.5GHz dual-core processor (STM STiH412); 1GB DDR3 RAM; 1x gigabit ethernet; 1x rear USB 3.0 port; 1x rear USB 2.0 port; 1x 92mm fan; Max capacity: 2x 8TB 3.5in SATA 3 disks; 165x100x226mm; 2-year warranty



NAS DRIVE

Synology DiskStation 216play

The DS216play is a network storage device aimed at home users. Synology didn't release a two-bay 'play' model in 2014, so this can be considered the successor to the DS214play, but some might think it's an upgrade from the DS415play. The headline feature is 4K transcoding, but aside from this and lower power consumption there's not much to tempt anyone to upgrade.

Price

Cheaper than the 214play, you can buy the DS216play for £190 from Amazon. This is around £40 less than the two-year-old model, and as you'll see below, there are reasons for this. We had expected it to be even cheaper, but most retailers are selling the NAS for more than Synology's list price of £186: there are no discounts to be found yet.

Remember that this is just the enclosure price. Expect to pay around £400 in total if you want a pair of 3TB NAS-specific disks as well.

Features

A NAS doesn't have to be good looking, but given that the 216play is aimed at home entertainment geeks, it's a shame Synology hasn't made more of an effort with the design. The matt plastic is inoffensive, but it's no object of desire. If anything the box feels flimsy and even cheap compared to other DiskStations.

There's no removable front panel or quick-release drive bays. There isn't even a USB port or SD slot on the front, so there's no easy copying of photo from your camera, or videos from a USB stick. At the back is a pair of USBs, only one of which is USB 3.0. You won't find eSATA or anything else. Beyond that's there's the expected Gigabit Ethernet. Unlike certain other entertainment-oriented NAS drives, there's no HDMI output for direct connection to your TV, nor any audio outputs. In essence, this is a box designed to be installed out of sight and used exclusively over the network.

Setup

Setup is a breeze, especially compared to older DiskStations. While we've moaned about the lack of slide-out disk trays, it takes only a couple of minutes to install each



disk, then two small screws hold the slide-on side cover in place. You then connect the power supply and the network cable to your router. And let's face it, you're probably not going to open it up again unless one of your disks fail.

Once powered up, you head to find.synology.com from your laptop or PC. This automatically searches your network and once the DiskStation is found, you just click a button to install the latest version of DiskStation Manager.

Less than 10 minutes later you can start using it. The old manual downloading and installing process

DSM 5.2

We're not going to cover DiskStation Manager in depth here, but for those unfamiliar this is the software that runs on all DiskStations. It's more of a fully-fledged operating system these days and while some others (QNAP) come close, it's widely regarded as the best. It's also worth noting that DSM 6.0 isn't far away and should bring new features for the 216play, such as offline transcoding.

There are plenty of features baked in, and plenty of native and third-party apps to download either through the on-board app store

The new QuickConnect service makes it easy to set up an ID and access your DiskStation remotely without the hassle of port forwarding

is automated and with the online discovery app, you don't even have to install Synology Assistant, although you can still do that if you have problems.

The new QuickConnect service makes it easy to set up an ID and access your DiskStation remotely without the hassle of port forwarding and using a dynamic DNS service. Of course, transfer speeds will depend mainly on your broadband upload speed and your mobile network (or Wi-Fi).

(Package Center) or directly from the app makers.

Synology's own apps don't all have wonderful, slick interfaces but they get the job done. There are mobile apps as well. DS File lets you browse your folders and access compatible content such as photos and videos, but there's separate DS photo, DS audio and DS video apps for each media type as well. There's also DS cloud as you can use your DiskStation as a personal cloud storage server, an

email client, DS cam for monitoring feeds from connected IP cameras, and the new DS note app which is a bit like Evernote and even offers an Apple Watch app (DS audio does, too). DS download allows you to search for torrent files online and download them straight to the NAS. All apps are available for Android and iOS.

When you log into your DiskStation you get a full windowed operating system in your browser. It can be a little confusing at first, but a tutorial helps you along the way. As with any NAS, you can set up user accounts with passwords, read-only and storage limitations.

You can also manage your storage volumes, choose between different RAID modes, create a backup schedule and much more.

For the DS216play, it's the video features that are of most interest. There's support for Apple TV (AirPlay), DLNA TVs, Chromecast and Roku, and via the DS video app you can stream videos stored on the DiskStation straight to those devices. Your phone - or tablet - can then be used as a remote control for not just choosing what to watch but controlling playback.

Assuming the information is there, you can use the app to filter your video collection by year, actor, director or other data. The app will also show if you've already watched a video, which is handy.

If you'd rather download the videos to your phone and watch them offline, that's also possible. DS video can also double up as PVR if you connect a compatible TV tuner to a USB port on the back.

None of these features are exclusive to the 216play, though - you can do this on pretty much any DiskStation. What's unique is support for 4K transcoding. That means 4K movies can be transcoded in real-time to 1080p or lower to be watched on your TV or mobile device. Whether you want to do that because of limited network bandwidth or the capabilities or performance of your device (media player or phone/tablet), it matters not: the DS216play can do it.

Its capabilities are somewhat limited though. First, you need to go into DSM and enable 4K transcoding as it's not on by default. It requires dedicating an extra bank of RAM, which is why it's turned off.

The box can handle up to 4K at 24fps for H.265/HEVC and 4K at 24fps for H.264/AVC. Video can be transcoded to H.264 or WebM VP8 at up to 1080p at 30fps. Alternatively, up to three streams of 1080p at 30fps can be transcoded to 720p at 30fps simultaneously. There's no support for transcoding via DLNA. In terms of video decoding, here's the full list:

- HEVC L4.1 (2160p at 30fps)
- H.264 AVC, one L4.2 (1080p at 60fps) plus one L4.1 (1080i at 60fps/1080p at 30fps) streams, or three L4.1 (1080i at 60fps/1080p at 30fps) streams
- H.264 MVC, SHP at L4.1 - 1080p at 30fps L30R
- H.264 SVC
- WebM VP8, up to 1080p at 60fps
- VC-1, MPEG-4, MPEG-2

This means you can stream 4K content from the DS216play at full resolution to your set-top box or Ultra HD TV.

There are issues, though. First is that the chip responsible for the transcoding is very different from previous DiskStations. It's an ST Microelectronics STiH412, a 32-bit dual-core 1.5GHz CPU. In older models, such as the DS214play, Synology used the QuickSync capabilities of the Intel Atom CE5335. The problem is that the architecture change means some third-party apps won't work, such as Plex. As of now, there's no news about when (or indeed if) Plex support will be added, so don't buy a DS216play in the hope that it will.

Performance

We tried streaming a 4K H.265 video to our 1080p Panasonic TV. The video played back smoothly, but we found that CPU usage hovered around 80- to 85 percent. That's hardly surprising, but it does mean you're not going to want to have other tasks running in the background, otherwise you could well end up with choppy playback.


File copy performance was tested with two 3TB Seagate disks in a RAID 1 - the most common setup for home users as files are mirrored between the

two disks and offers security for your files should one disk fail.

Synology claims a read speed of 108MB/s for large files with a similar setup and we saw roughly 100MB/s. For write speed, we were looking to match Synology's figure of 91.5MB/s, and almost did at just over 88MB/s.

When you copy a load of small files, performance drops considerably, as you'd expect. In line with Synology's figures, copying a 20GB basket of photos from 1- to 3MB, we saw a read speed of 51MB/s and a write speed of 26MB/s. Your mileage will vary, depending on the disks you use, your home network equipment and your PC or other device you use to read or write files. Suffice to say that the 216play isn't a bad performer considering the price, and you shouldn't expect the faster speeds you'd get from DS216, especially if you're dealing with encrypted files. That's unlikely in a home setting, which is why only the models designed for business use have hardware encryption engines.

Verdict

The 216play will likely be a disappointment to 214play owners wondering about an upgrade. It makes sense only if you have - or will soon have - lots of 4K content that you need to transcode on the fly. Its performance is good, but if you don't need real-time transcoding, you may want to opt for a different DiskStation (or indeed another NAS entirely), which has the extra ports and SD slot that the 216play lacks.  **Jim Martin**



£199 inc VAT

Contact

sapphiretech.com

Specifications

AMD Radeon R9 380X;
28nm; 1040MHz core clock;
6000MHz memory clock;
256-bit memory bus; 2048
processor cores; 128 ROPs;
DirectX 12, OpenGL 4.5;
4GB GDDR5 RAM; Dual-X
fans; 2x 6-pin PCIe; 1x
DisplayPort 1.2, 1x HDMI
1.4a, 1x DVI-D, 1x DVI-I;
237x126x37mm; 2-year
warranty

Build: ★★★★★

Features: ★★★★★

Performance: ★★★★★

Value: ★★★★★



GRAPHICS CARD

Sapphire Nitro R9 380X 4G D5

Six months after the introduction of AMD's most affordable mid-range gaming GPU, the Radeon R9 380, the company launched the slightly faster R9 380X. The original R9 380 came with 256 of its processor cores disabled, leaving a total of 1792 available for use, but now the R9 380X comes with all 2048 cores available for use. Other than that, the two GPUs are the same.

Price

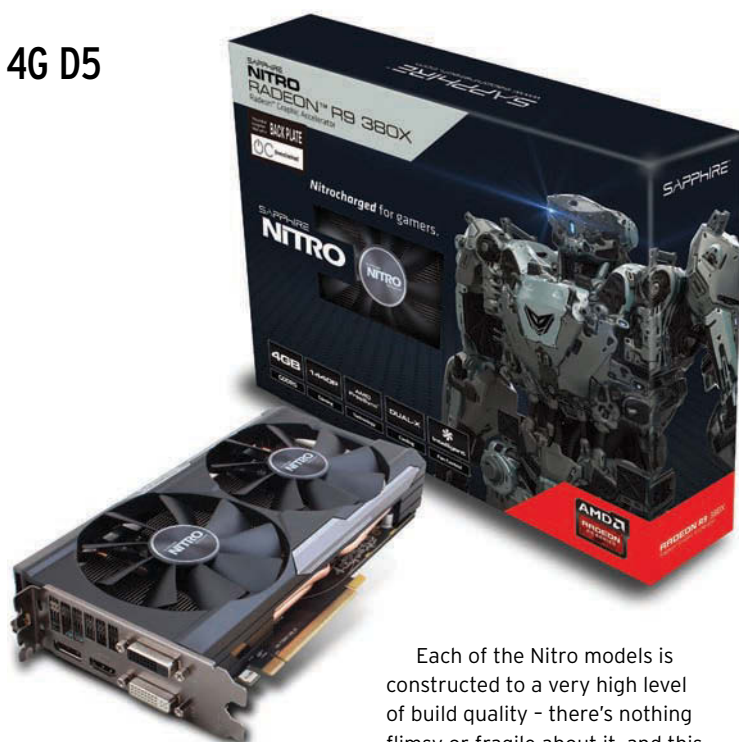
You can buy the Nitro R9 380X 4G D5 for £199 from Scan (scan.co.uk). The part code is 11250-01-20G.

An almost identical version of this card - part code 11242-07-20G - is available with the original R9 380 GPU, with is also made in a version without the backplate and with slower clock speeds out of the box. It costs around £180. For a more considerable saving, you could go for a 2GB version of the R9 380 card, either with or without the backplate.

With so many slightly different models available, it's important to make sure of exactly which version you're looking at when buying - especially if you're hunting for the lowest available price.

If you can afford it, we would recommend going for a 4GB model with a backplate, as it's less likely to get damaged, it's faster, and it's more capable of being pushed to higher resolutions, thanks to the additional memory.

At the time of writing, the price difference between Sapphire's R9 380 and R9 380X versions is only around £20, so unless you're working to the very strictest of budgets, we'd suggest going for the R9 380X. The difference



in performance is small but measurable, and resale value is likely to be higher. The R9 380X also represents the highest performance you can get before a big price jump up to the R9 390, which costs around £270.

Features

This 'Nitro' version from Sapphire builds upon AMD's reference design by adding an advanced cooling solution with twin thermostatically-controlled fans and thick heatpipes enabling quieter operation, along with a preset factory overclock for an additional boost in performance.

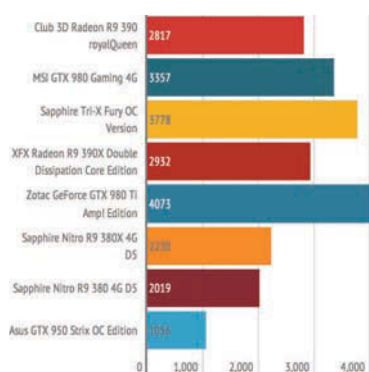
The Nitro R9 380X 4G D5 now sits at the top of Sapphire's extensive range of cards based on AMD R9 380-series GPUs, which includes no fewer than five models based on the standard R9 380, four of which are designated 'Nitro'.

Each of the Nitro models is constructed to a very high level of build quality - there's nothing flimsy or fragile about it, and this 4GB R9 380X version comes with a backplate, which shields the boards internal components while helping with heat dissipation.

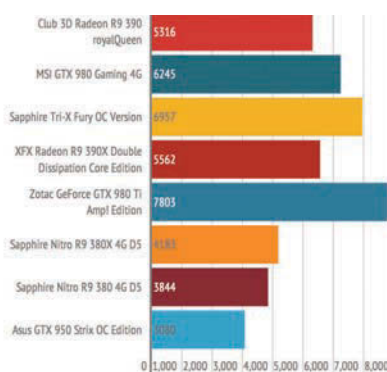
The board features a full-height dual-slot design, so keep this in mind if your system case is tight on space, but it should fit in most standard systems with ease. You'll need a pair of six-pin PCI-E connectors to power it, and with a claimed maximum power draw of 225W you shouldn't need a beefy PSU to keep it running. The card comes factory overclocked to 1040MHz - up from AMD's standard speed of 970MHz and you can push for even higher speeds using the supplied TriXX overclocking software. On-board memory also gets a 5 percent performance boost as standard.

One up and running, it's possible to see the twin cooling fans of the 'Dual-X' cooler spinning up and down individually as required

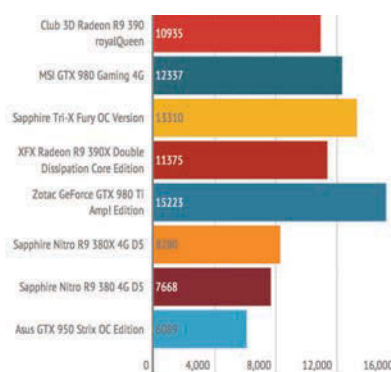
3DMark Fire Strike Ultra



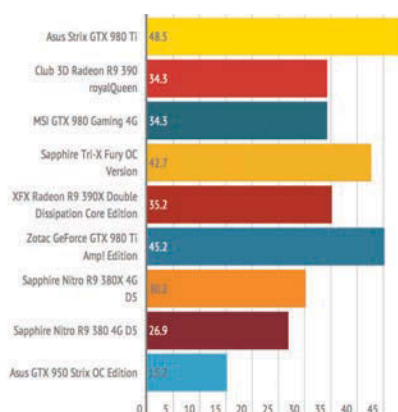
3DMark Fire Strike Extreme



3DMark Fire Strike



Alien vs Predator 4K



above a large heatsink, which runs the full length of the board and is fitted with thick 10mm heat pipes to improve thermal transfer. This allows the board to run very quietly or even silently in some situations, allowing distraction-free use when performing non-gaming tasks.

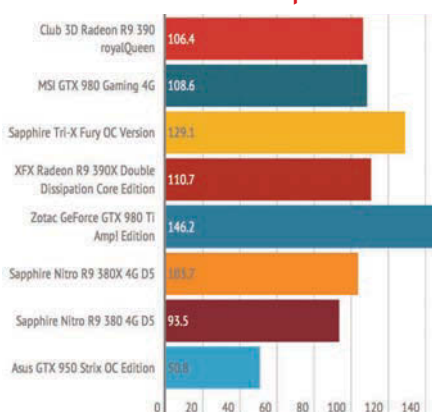
Connectivity

Two DVI ports are provided, one of which supports DVI-I for those old-school VGA monitors along with one HDMI 1.4 and one full size DisplayPort connector. The lack of HDMI 2.0 limits 4K playback on TVs to lower refresh rates, but you can drive 4K monitors at 60Hz via the DisplayPort connector - although we wouldn't advise trying that for gaming with this card as it doesn't really have enough power to do so.

Of course, the card supports the latest AMD features, including Frame Rate Target Control to save power, FreeSync for super-smooth playback at variable frame rates, TrueAudio for accelerated sound processing and Virtual Super Resolution for higher quality graphics on lower-resolution displays.

If your motherboard and power supply support it, you can boost performance by adding

Alien vs Predator 1080p



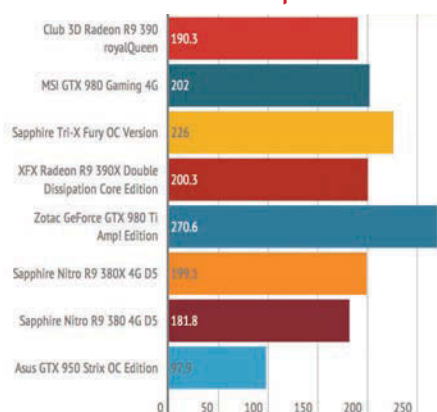
a second AMD graphics card in CrossFireX mode. There's no bridge connector required on this card and it's happy to team up with a relatively wide range of AMD cards, including the previous R9 285 series. The R9 380X isn't a huge upgrade from the R9 285, but being able to keep your original card may make adding a new R9 380X an interesting proposition.

Performance

In our tests, the Sapphire Nitro R9 380 4G D5 does indeed deliver solid performance at 1080p, allowing high or sometimes even Ultra settings to be selected with average frame rates in the region of 60fps not uncommon, depending on the individual games. You will still have to reduce settings a little on some of the most demanding titles to ensure the smoothest gameplay, but in general you'll be ready to take on any game at enjoyable quality levels.

Push it much higher than this and you might start to get into trouble, but many games will be quite playable at 1440p with slightly lower quality settings. This makes the card a great choice for gaming on a full HD TV. There's a big jump in price and performance between the

Alien vs Predator 720p




R9 380 and the R9 390, so if your budget is limited, an overclocked R9 380X such as this is a great choice.

It's a big step up in performance from something like an nVidia GeForce GTX 950, although both are aimed at 1080p gaming.

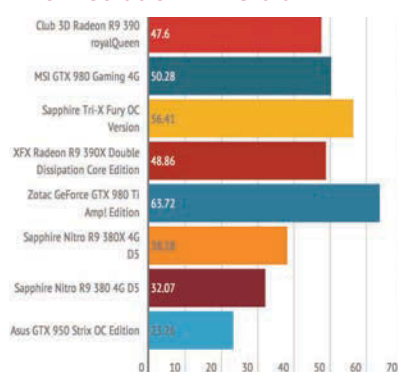
One of AMD's advantages is that you can mix and match certain different cards into multi-GPU setups. So, even if you have an older card such as an R9 280, you can add an R9 380 to your existing setup and the two cards will work together.

However, if you manage to find a great deal on an original R9 380, you won't be sacrificing much in performance, so it may be a bargain. Ultimately, it will come down to the prices available when you choose to buy.

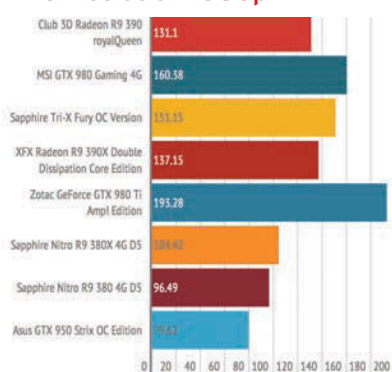
Verdict

Sapphire's Nitro R9 380X 4G D5 is a competent card with excellent build quality, features and boosted performance. It's quiet in operation and will enable 1080p gaming with high quality settings and have a decent stab at 1440p too. However, keep a look out for the original R9 380 version, which may be a great deal if the price is right.  **Paul Monckton**

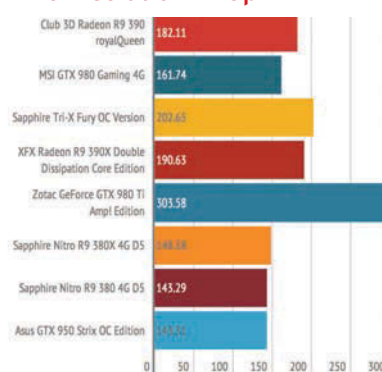
Alien Isolation 4K Ultra



Alien Isolation 1080p

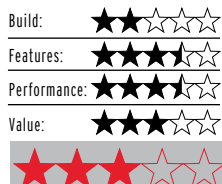


Alien Isolation 720p



£61 inc VAT**Contact**■ canon.co.uk**Specifications**

4-colour (CMYK) inkjet printer; 4800x1200dpi print resolution; 2400x1200dpi scanner resolution; Wi-Fi, USB, Apple AirPrint; 100 sheets A4; 152x449x304mm; 5.4kg



MULTIFUNCTION DEVICE

Canon Pixma MG3650



At just £61, Canon's new Pixma MG3650 is an affordable and versatile multifunction inkjet printer for home users - but, as always with low-cost printers, you need to keep an eye on the cost of the replacement ink cartridges.

The low price means the MG3650 doesn't have too many frills. There's no LCD control screen, for example. There's just a small set of buttons on the top-left corner of the printer and the phrase, which came to mind when we checked build quality, was 'cheap and cheerful'.

The cover for the scanner unit seemed particularly flimsy and we almost pulled it off when first setting up the printer. It doesn't even have a proper internal paper tray, instead relying on a small plastic flap that folds out from the front of the unit to support a stack of up to 100 sheets of A4 paper. But at least that keeps the overall size of the printer down, and the MG3650 will easily fit on to a nearby shelf or desk without taking up too much space.

Along with its main printer, scanner and copier functions, the MG3650 provides both USB and Wi-Fi connectivity, along with duplex (two-sided) printing and support for Apple's AirPrint for iOS devices. There are also apps for both iOS and Android that provide additional

options for printing photos, as well as the ability to control the scanner and save your scanned images directly on to your mobile devices.

Performance


Printing performance is also good for such a low-cost device. Its print speeds are relatively modest - we got nine pages per minute (ppm) when printing simple text documents, and 5ppm for colour, while a 6x4in postcard print took 50 seconds. That should be fine for general day-to-day use at home, though. Text and graphics output were both good, and our photo prints were bright and colourful, so the MG3650 can certainly handle a wide range of printing tasks.

However, alarm bells started ringing as soon as we saw the size of Canon's little ink cartridges. If you shop around online you can find the standard black ink cartridge on sale for around £11, while the standard tri-colour cartridge - which includes all three cyan, magenta and yellow coloured inks - comes to about £14. Those prices don't seem too bad until you discover that the black cartridge lasts for just 180 pages, which works out at just over 6p per page - an astronomical price. Fortunately, the larger XL black cartridges provide better value,

costing about £17 for 600 pages. That brings the price down to 2.8p per page, but even that is still a little above average for mono printing.

Thankfully, colour printing is more reasonable. At £14, the standard tri-colour cartridges gives you a cost of around 7.8p per pence per page, which is average for inkjet colour printing. Step up to the XL cartridge at £18 and the cost falls to a surprisingly reasonable 4.5p per page. Even so, the high cost of Canon's black ink cartridges is still disappointing. Canon's rivals have introduced new products such as Epson's EcoTank printers and HP's Instant Ink subscriptions, which do a lot to reduce the long-term cost of printing, while Canon seems content to stick with the traditional approach of selling its printers cheaply and making big profits on the replacement cartridges.

Verdict

The high cost of Canon's black ink cartridges means that the MG3650 isn't a good choice for people who mostly just need to print simple text documents. Fortunately colour printing is far more competitive, so it's worth considering if you need a printer that can handle colour graphics, or printing photos from your mobile devices.  **Cliff Joseph**

£25 inc VAT**Contact**

■ tronsmart.com

Specifications

5x USB outputs with Quick Charge 2.0 and VoltIQ; max output 90W (18W per USB port); 160x81x28mm; 292g

DESKTOP CHARGER**Tronsmart Titan**

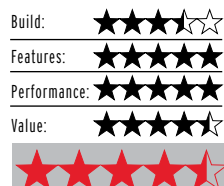
With a name like Titan, the size of this thing shouldn't be underestimated. At 292g and 160x81x28mm it's a beast, and roughly twice the size of the other desktop chargers we've seen. But the Titan is designed to sit on your desk and stay there, rather than go with you on your travels as a compact multi-charger.

The design is functional, a matt black box with flashes of gloss at the edges. Lying flat on the desk a Tronsmart logo is visible from the top, and around the back is a dedicated power switch that lets you turn off the charger without unplugging it from the mains – this will prove attractive to those who worry about trickle-charging devices munching away at their electricity.

From the front you can see five USB ports, each with a green plastic prong inside. In the world of charging green (or blue) is used to signal speed. And this desktop charger from Tronsmart has loads of it to hand.

We've seen a couple of desktop chargers from Choetech and Aukey that support one or two USB ports compatible with Qualcomm Quick Charge 2.0. All five ports on the Titan support the technology, plus there's VoltIQ intelligent device recognition for phones and tablets that do not,

LG G4) to support faster charging that can see charging time reduced by up to 75 percent. The technology is usually seen in flagship devices but is becoming more commonplace,

PC ADVISOR
RECOMMENDED


If, like us, you're a bit of a gadget hoarder, a device that can simultaneously charge five phones or tablets at high-speed is a must-have

allowing the Titan to deliver an optimum charge to suit the device.

Quick Charge 2.0 is a technology that allows phones and tablets with certain Qualcomm Snapdragon processors inside (for example the

hence the need for five suitably equipped ports on the Titan.

When compared to other desktop chargers the Tronsmart Titan also has the highest maximum power output. Rated at 90W, it can deliver a full 18W (that required for Quick Charge 2.0) to each of its five USB ports simultaneously. This means it will be as efficient with one phone plugged in as it would with five.

If, like us at PC Advisor, you're a bit of a gadget hoarder, a device that can simultaneously charge five phones or tablets at high-speed is a must-have. You won't find a better one than the Tronsmart Titan.

Verdict

It's bigger and bulkier than many desktop chargers we've reviewed, but for roughly the same amount of money it offers five times as many quick-charging USB ports and a dedicated power switch. Highly recommended. **Marie Brewis**



£25 inc VAT**Contact**■ choetech.com**Specifications**

60W desktop USB charger;
AC 100- to 240V input with
1.5m power lead; 2x
(5V/9V/12V) 15W Qualcomm
Quick Charge 2.0-certified
USB ports; 4x (5V/2.4A) 12W
smart USB outputs;
71.5x29x88.4mm; 158g;
12-month warranty

Build: ★★★★★☆
Features: ★★★★★☆
Performance: ★★★★★☆
Value: ★★★★★☆
★★★★★

DESKTOP CHARGER

Choetech 60W 6-port Desktop USB Charger


PC ADVISOR
RECOMMENDED

With six USB outputs in total, two of which are compatible with Qualcomm Quick Charge 2.0, this Choetech Desktop Charger is seriously fast. It has a 60W total output, which is double that of many desktop chargers on the market, and means that with all six ports in use each can average a fast 10W output.

Qualcomm Quick Charge 2.0 is an awesome technology for devices with which it is compatible. Our Samsung Galaxy S6, for example, can get a 40 percent charge in half an hour, so whereas other phones can take two- to three hours to juice up this one does it in just over an hour. Not all smartphones and tablets support the technology, but for those that do it offers up to a 75 percent reduction in charging time.

Even if your devices don't support Quick Charge, the fast-charging ports can each offer up to 12W output. Smart technology can recognise your device type and automatically deliver the correct amount of power, too.

Leaving aside the sheer usefulness of this fast multi-USB charger, the Choetech is also a

nice-looking device. It's compact, just 71.5x29x88.4mm and 158g, with a black plastic casing that has a smooth, rubbery soft-touch finish and rounded edges. The two Quick Charge ports are instantly recognisable by their blue- rather than black prongs.

The Choetech feels well made and as though it has been built to last. A power lead (supplied in the box along with a Micro-USB cable) plugs into its rear and, at 1.5m, is long enough to be tucked behind the desk and hidden out of sight.

The design isn't entirely without fault, though. With the device specifications and Qualcomm Quick Charge logo covering half of one of the two larger panels, you're probably going to want to lie this device flat on a desk to conceal it. We prefer to stand our desktop chargers upright to save space, but

doing so would put this information on full view on the device's right side. There are also two Choetech logos on the top of the device, which is a bit OTT, and a large 'USB charger' legend imprinted on the rear, which is unnecessary.

The Choetech is available to buy from Amazon UK for £25. Other desktop chargers are cheaper, but can't come close to the Choetech's performance. A great buy.

Verdict

With a massive 60W total output and support for Quick Charge 2.0 the Choetech Desktop Charger shoots straight to the top of our chart. We'd be happier with less in the way of logos, specifications and other information printed on the device, but the design is otherwise very nice. A recommended buy at £25.

✉ Marie Brewis

It has a 60W total output, which is double that of many desktop chargers, and means that with all six ports in use each can average a 10W output

£23.99 inc VAT**Contact**■ choetech.com**Specifications**

Qi wireless charging pad;
input 5V/1.5- to 2A; output
5V/1A, 5W; conversion
efficiency 75 percent* 3
coils (works in portrait and
landscape mode); stand
design; charging distance
0- to 5mm; 5.2x3.2x4.1in;
172g; 12-month warranty

Build: ★★★★★

Features: ★★★★★

Performance: ★★★★★

Value: ★★★★★

**WIRELESS CHARGER****Choetech Iron Stand Qi Wireless Charger**

The Iron Stand from Choetech is a great idea, propping up your phone and allowing you to wirelessly charge it in any orientation while you sit back and enjoy a video.

We've spoken about the benefits of Qi wireless charging before, but you really have to try it to see just how convenient it is. We love being able to simply throw down our phone and pick it up fully charged, without having to fumble around plugging in- and unplugging cables.

This Choetech wireless charger is one of the better examples we've seen, with some compelling features and a nice-looking, sturdy-feeling design. Despite this, it costs just £23.99 from Amazon. Yes, that's expensive for a wireless charger, but this isn't any old Qi pad.

A single piece of metal is folded into a stand, with a lip at the front to secure your device and two rubber feet to keep the stand in place on the desk. The inductive technology is built into the front, but all you see is a mirror-finish charging plate that is nearly as large as the stand itself. Four LEDs and a Micro-USB port are found on the right side.

The stand is just over four inches tall, which means it will sit short of most smartphones in portrait mode, and they'll overhang at the edges in landscape mode. This is a good thing, making it easy to quickly pick up the device, and putting your phone's screen rather than the charger on display.

Provided your phone supports induction charging, we see two main problems with Qi wireless charging. First, you have to place down your

phone on a wireless pad, often in a very precise position, which can make using your phone as it charges difficult - particularly if you're trying to send a text.

This Choetech Iron Stand eliminates this problem by building in not one but three induction coils. This means you can place your phone in any position on the stand - portrait or landscape, upright or upside down - and it will charge. It also props up the device for easier viewing or access to the screen, which is ideal if you want to use your phone for playing back media or simply don't want it wobbling away on a circular pad as you prod away at the virtual keyboard.

The second issue is that wireless charging is slower than charging in the traditional manner, and especially so if your device supports Quick Charge. That's because the standard is limited to 5W.

For us wireless charging is practical only when you have time to spare, such as when charging your phone overnight or when it's sitting on your office desk all day long. It's at these times the Choetech is a great gadget; at other times you can simply unplug its Micro-USB cable and attach it directly to your phone for faster charging.

**PC ADVISOR
RECOMMENDED**

Bearing in mind that we often wirelessly charge our phones at night, then, we like the fact the Choetech's four blue LEDs sit on the device's side. Rather than flashing away at the front of the device, distracting you when watching a film or potentially keeping you awake, they sit hidden away out of view.

The LEDs will flash to let you know power has been connected, but glow a constant blue while wireless charging occurs. What happens when charging is complete depends entirely on your phone: if it sends a signal to say it's done then the Choetech will enter standby mode; if it doesn't then the Iron Stand will continue delivering power at a low rate.

Verdict

It's expensive for a wireless charger, but this Choetech Iron Stand is not just a wireless charger. With three inductive coils built into its metal stand design, you can prop up your phone in any orientation and continue to use it as it refills its battery. That makes this Choetech one of the better Qi chargers we've seen. **Marie Brewis**

A single piece of metal is folded into a stand, with a lip at the front to secure your device and two rubber feet to keep the stand in place on the desk

£74 inc VAT**Contact**■ lego.com/en-gb**System requirements**

Nintendo Wii U; Sony
PlayStation 3/4; Microsoft
Xbox 360/One

GAME

Lego Dimensions



These days, new games are pretty pricey, but at £74 (£69 on older consoles) Lego Dimensions is expensive. This is also for the 'Starter Pack', so it doesn't even get you the entire game. That said, it comes with a Toy Pad on which you place characters to play in the game. You get Batman, Gandalf, and Wyldstyle in the box, along with the Batmobile (see below). Furthermore, you get the Lego Gateway, which sits on top of the Toy Pad and is what the game's characters jump through to visit different worlds. Don't just build this from the manual though, as the process is part of the game.

As we've touched upon, the Starter Pack doesn't get you the entire Lego Dimensions game. You can play through the story mode with the provided characters and vehicle, but there are more levels

and also plenty of things you can't do without buying more figures.

Level packs cost around £25 to £30 and come with three extra figures - a character and two vehicles. These can be used in the regular levels and the new one that the pack unlocks. There are also Fun- and Team Packs, which simply come with extra characters and vehicles to use in game. Collecting them all will, however, cost over £300 in total.

Gameplay

Previously, you'd buy a Lego game related to the franchise you're interested in - whether that be Harry Potter, Star Wars or Pirates of the Caribbean. What Lego Dimensions does is create a mash-up of worlds. You can play either on your own or with someone else.

Lego Dimensions includes characters from DC Comics, The Lord of the Rings, Back to the Future, The Simpsons, Portal 2, Lego Ninjago, Doctor Who, The Wizard of Oz, Lego Chima, Jurassic World, Scooby-Doo, Ghostbusters, and Midway arcade games.

The story, in a nutshell, is that Lord Vortech (voiced by Gary Oldman) is trying to merge all the universes into one under his control using 11 Foundational Elements, or keystones. The three starter characters are sucked into a vortex from their respective worlds and must join forces to set things right.

We loved that we could be Batman in the The Simpsons' house or get Gandalf to drive the Batmobile around Doctor Who's TARDIS. There are so many combinations and the voice-overs are excellently acted.

If you've played previous Lego games, you'll be familiar with the third-person system and most of the mechanics. You'll still be running around collecting studs, looking out for the illusive blue ones, and switching characters as and when you need to.

The big difference is the Toy Pad. Not only do you get the thrill of building it yourself, but it's more advanced than other offerings in the so-called 'toys-to-life' market. A long cable is provided, so you can have the base near you, which you'll need to do as we found out. It has three sections on which you can place up to seven NFC-enabled toys. This means if you buy extra packs, you can choose which characters and vehicles you use on a level. These can be swapped as and when you need them - they appear and disappear on the screen through the ground via a vortex.

The Toy Pad also lights up and changes colour, which both looks great and is part of the game. This moves it from a nice functional idea to an integral part of the game. For example, a boss might zap a character with a force field and you'll need to move them to a





different section of the pad in order for them to escape, or you'll need to move a character around the sections in a particular sequence to build something in the game. However, it's not always intuitive to use, despite on-screen hints, and sometimes the changing colours don't provide enough information, and we found ourselves having to look online for help. Some extra guidance in-game when the player is clearly struggling to figure it out would have been a good idea - especially since the game is geared towards kids and adults.

There are also sections of levels that require certain characters for -


even in the very first level, which we think is a bit harsh. If you don't want to splash out on all the extra packs needed, you can 'hire' a character for the task, though this will cost you a whopping 50,000 studs.

You'll want to collect the studs in order to upgrade your vehicles, though. Do this enough times and you'll be given the option to buy a new version. Spending studs on an upgrade provides you with an on-screen instruction book showing you how to rebuild the machine into a different version using the same bricks.

We tested Lego Dimensions on a Wii U, and it's worth pointing out

that the game doesn't make good use of the Game Pad's additional screen. You simply get a duplicate of what's on the TV. We also discovered a number of glitches, particularly with the level that comes with the Doctor Who Level Pack.

Verdict

Despite a few niggles and the high cost should you buy the whole set of characters, there is a lot of fun to be had with Lego Dimensions. Mashing up characters and worlds is fantastic, and the NFC base adds an extra level. We just need to resist the urge to splash out on the entire collection.  **Chris Martin**



BEST PHONE CAMERAS

2016

Jim Martin tests out the latest flagship phones to find out which performs best for photos, videos, selfies, macro and selfies

In our September 2015 issue, we tested the cameras of nine flagship smartphones, including the Apple iPhone 6, LG G4, Samsung Galaxy S6, Sony Xperia Z3 Compact and HTC One M9. Over the following pages, we reveal which of the latest top-of-the-range offerings performs best for photos, videos and selfies.

This isn't meant to be an exhaustive test of every camera feature on each phone. We didn't test slow motion, time-lapse and burst modes, for example. Instead, this is intended to be a useful comparison for anyone looking to choose a phone based on the quality of its standard photos and videos.

If you're wondering why the Lumia 950 or 950 XL isn't here, it's because Microsoft wasn't able to get us test phones in time.

How we tested

We set up each phone to the highest resolution available for photos and videos. That meant switching aspect ratio from the

default if necessary for the front and back camera. We didn't use any RAW modes, just the standard JPEG mode.

For each test, we took the photos within minutes of each other to ensure conditions were as similar as possible.

We didn't use any tripods, since virtually all photos are taken handheld with a phone. This meant stabilisation systems - whether optical or electronic - could prove their worth.

Again, opting for real-world shooting, we selected automatic modes and didn't tap the screen to choose focus or exposure points. Few people do this and it allowed us to assess the cameras' automatic exposure systems. The tests are not scientific: we

haven't used test images to check for focus, distortion and other technical characteristics. These are real-world photos, so they give the same results you can expect when you use the phone yourself.

Every image was taken from the same spot, which is why the field of view changes from phone to phone. Different cameras have different lenses: some more wide-angle than others. Also playing a major part is the sensor format. Some are 16:9, while others have 4:3 sensors. In each case, we made sure that we used the highest resolution available - many Android phones default to 16:9, which chops the top and bottom off the photo for phones with 4:3 sensors.

We didn't use any tripods, since virtually all photos are taken handheld with a phone. This meant stabilisation systems - whether optical or electronic - could prove their worth



Photography by Dominik Tomaszewski

	MAIN CAMERA RESOLUTION	FRONT CAMERA RESOLUTION	VIDEO (MAXIMUM RESOLUTION)	OPTICAL STABILISATION	FLASH	DEDICATED CAMERA BUTTON
Apple iPhone 6s Plus	12Mp	5Mp	4K 2160p at 30fps	Yes	Dual-tone LED	No
Google Nexus 5X	12.3Mp	8Mp	4K 2160p at 30fps	No	Dual-tone LED	No
Google Nexus 6P	12.3Mp	8Mp	4K 2160p at 30fps	No	Dual-tone LED	No
HTC One M9	20Mp	4Mp	4K 2160p at 30fps	No	Dual-tone LED	No
Motorola Moto X Force*	21Mp	5Mp	4K 2160p at 30fps	No	Dual-tone LED	No
LG G4	16Mp	8Mp	4K 2160p at 30fps	Yes	LED	No
OnePlus 2	13Mp	5Mp	4K 2160p at 30fps	Yes	Dual-LED	No
Samsung Galaxy S6 Edge+**	16Mp	5Mp	4K 2160p at 30fps	Yes	LED	No
Sony Xperia Z5***	23Mp	5Mp	4K 2160p at 30fps	No	LED	Yes

* The Moto X Force uses the same cameras as the Play and Style, so you can use the examples on the following pages as if they were from those phones

** The Samsung Galaxy S6, S6 Edge and S6 Edge+ use the same cameras, so the photos and videos are representative of all three phones

*** The Xperia Z5, Z5 Premium and Z5 Compact also share the same front and rear cameras

ST. PANCRAS HOTEL



Apple iPhone 6s Plus

It's a murky-looking shot, however, the HDR mode means the sky hasn't been blown out. Detail and sharpness is good, but there's not all that much more detail compared to the 8Mp iPhones from 2014. It may look murky, but it's close to what the scene actually looked like. Some of the phones managed to brighten it up more using HDR (such as the Nexus 5X and 6P), but in reality, St. Pancras was dark.



Google Nexus 5X

The 5X has chosen a slightly cooler white balance than other phones, but the HDR+ mode (which we recommend using in the full 5X review) has brought out shadow detail and prevented the sky from turning white. It's a sharp photo with plenty of detail.



Google Nexus 6P

It's hardly surprising that the Nexus 6P's photo is virtually identical to the 5X, since they use the same camera. The only difference is that the 5X lacks image stabilisation.

ASPECT RATIO

We have printed the photos at their native aspect ratios here to show the full field of view captured by each camera. For the rest of this feature, we have cropped them all to 16:9.



HTC One M9

We were disappointed by the M9's main camera. The HDR mode is hidden away as a shooting mode in its own right and isn't something that will turn on automatically, so we left it disabled here. The overall exposure is dark, but more of a let-down is the heavy-handed noise reduction, which leaves the brickwork smudgy. The 16:9 sensor means you don't see as much of the scene as phones with 4:3 sensors.



Motorola Moto X Force

It's a decent effort from the Moto X Force, although the highlights are blown out. It makes for a better-looking photo overall, but there's less potential to get a better image in Photoshop due to the clipping. Focus, sharpness and detail levels are all good, but compression artefacts are visible in the brickwork and tiles.



LG G4

An appalling misfire from the G4. It's hard to see without looking up close, but the whole image is fuzzy, with low detail levels. It wasn't caused by shaky hands, since both test shots came out the same.



OnePlus 2

Aside from the over-saturated colours, which have turned the brickwork to orange, this is a good shot from the OnePlus. Focus and exposure are respectable, and although there's some evidence of noise, detail is retained and there are minimal compression artefacts.



Samsung Galaxy S6 Edge+

One of the best, if not the best, photos in these conditions. We already knew the S6 had a great camera and this is a well-exposed shot that exhibits great detail levels. There's a lot of sharpening, but the result is a usable photo that doesn't require much editing at all.



Sony Xperia Z5

As we've seen from Sony before, the Z5 delivers a strangely ghostly image that's artificially bright. The wide-angle lens introduces some distortion and focus is a little soft. At least the colours are natural.

OUTDOOR PHOTO



Apple iPhone 6s Plus

Here the iPhone 6s demonstrates why it's one of the best phones for photography. The exposure is excellent, as is focus and white balance. There's just the right amount of sharpening and no noise. There's purple fringing on the tree branches, which is a little more pronounced than other phones, except the OnePlus 2.



Google Nexus 5X

The HDR+ mode ensures another great photo from the Nexus 5X. There's lots of sharp detail, and the sky isn't blown out. It isn't identical to the 6P's photo, though. The framing is slightly different and the leaves on the trees look washed out. This could be due to the metering system choosing a different exposure to the 6P's. Sometimes it will be perfect, other times not.



Google Nexus 6P

The 6P is capable of great photos with HDR+ turned off, but in scenes like this it helps to retain highlights. And as you can see, there's blue rather than white sky in this example.



HTC One M9

When we tried the HDR mode on the One M9, we were rewarded with a blurry, out of focus photo. The above image was shot without HDR, and is much better for it. It's sharp and detailed, though the limited range means the sky and tree branches are over-exposed.



OnePlus 2

A great shot from the OnePlus 2. Colours are natural, focus is sharp and detail levels are excellent.



Motorola Moto X force

The Moto X Force has over-exposed this shot. Although colours are good, detail is soft in places, especially near the edges. It's a respectable photo, but not in the same league as the Nexus phones.



Samsung Galaxy S6 Edge+

The ever-consistent Galaxy S6 delivers another great photo. Exposure, focus and white balance are all great. The image isn't as sharp as the OnePlus 2's, though.



LG G4

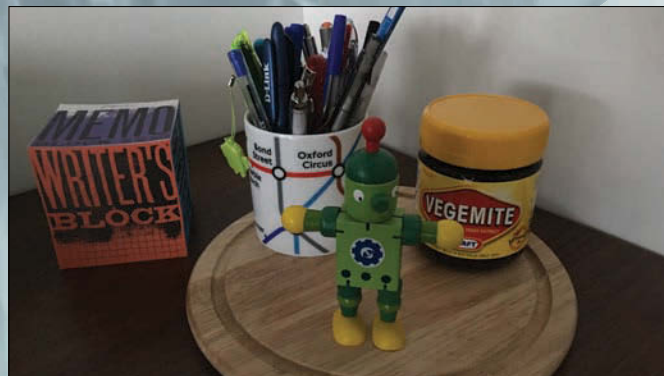
At this reduced size, the LG G4's photo looks fine, but zoom in and the same fuzziness seen in the St. Pancras photo is evident. It doesn't suffer from the same purple fringing as the iPhone, though.



Sony Xperia Z5

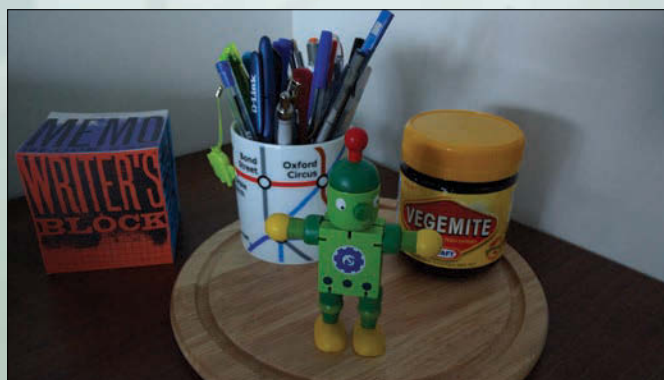
The metering hasn't compensated adequately for the bright sky, which affects the phone box, which appears faded compared to other phones. Details are sharp, though.

LOW-LIGHT PHOTO



Apple iPhone 6s Plus

The iPhone 6s isn't as competent in low light as Apple would have you believe. The white balance is off, and there's noticeable amounts of noise. No doubt the smaller pixels have had in impact here: the iPhone 6 and 6 Plus may have fewer pixels to play with, but the fact that they're larger means they can receive more light.



Google Nexus 5X

Whether the difference between the 5X and 6P's low light photos is down to shaky hands or the lack of electronic image stabilisation (EIS) we can't say for sure. But the 6P's effort is noticeably sharper, which suggests the EIS is doing its job on the more expensive phone.



Google Nexus 6P

Proving itself a good all-rounder, even if it lacks optical stabilisation, the 6P manages a sharp photo in little light. If you have particularly shaky hands, you might not get results as good as this.



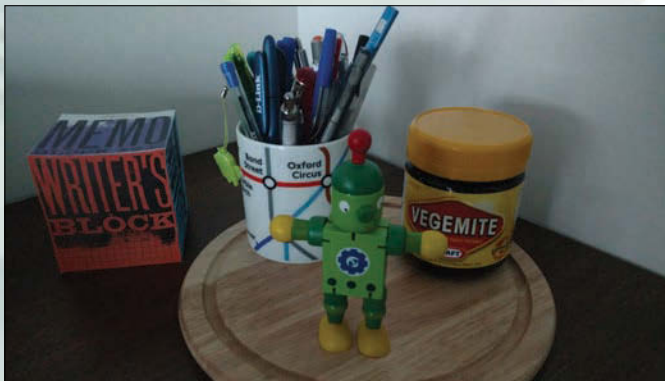
HTC One M9

As well as lacking in shadow detail, HTC's photo shows heavy-handed noise reduction, which eliminates detail and leaves everything very smudgy-looking. Of course, looking at the whole photo on screen and avoiding zooming in 1:1, you won't really notice. But even so, the One M9 isn't a great low-light performer.



OnePlus 2

Not a bad effort from the OnePlus 2. Focus is a little soft, and there's a fair amount of noise, but more expensive phones fared worse here.



Motorola Moto X Force

This is a gloomy, dingy-looking scene, with compression artefacts easily visible when you zoom in to check the detail. But even without looking at the actual pixels, it's obvious to see where noise has been removed: look at the wall behind the Vegemite jar.



Samsung Galaxy S6 Edge+

Like the OnePlus 2, the Galaxy S6 Edge+'s photo is a little soft, but the exposure is better and there's far less colour noise. In fact, this is one of the best low-light photos of the group.



LG G4

The LG G4 excels in low light. In fact, it's almost as if we lit up the room compared to, say, the One M9 and Moto X Force. (We didn't - the exposure was 1/9 second) There's a lot of noise, but we're happy to live with that given the quality of the image as a whole: details are still sharp and haven't been obliterated by noise reduction.



Sony Xperia Z5

The Z5 does an admirable job in limited light with a good exposure, good detail and limited noise. The soft focus on the left side of the image - noticeable on the memo pad - is disappointing, though.

SELFIE

This is a test of each phone's front camera. We disable any beauty modes, so that we can more accurately judge the detail captured by each camera. On phones such as the Samsung Galaxy S6 Edge +, the mode is enabled by default, and while it does improve selfies for the ladies (there are also options to enlarge the eyes), men will want to turn it off immediately.



Apple iPhone 6s Plus

Apple may have upgraded the iPhone 6's 1.2Mp camera to 5Mp, but selfies still lack detail. Skin tones are realistic and not oversaturated, but the highlights are blown out and focus is soft.



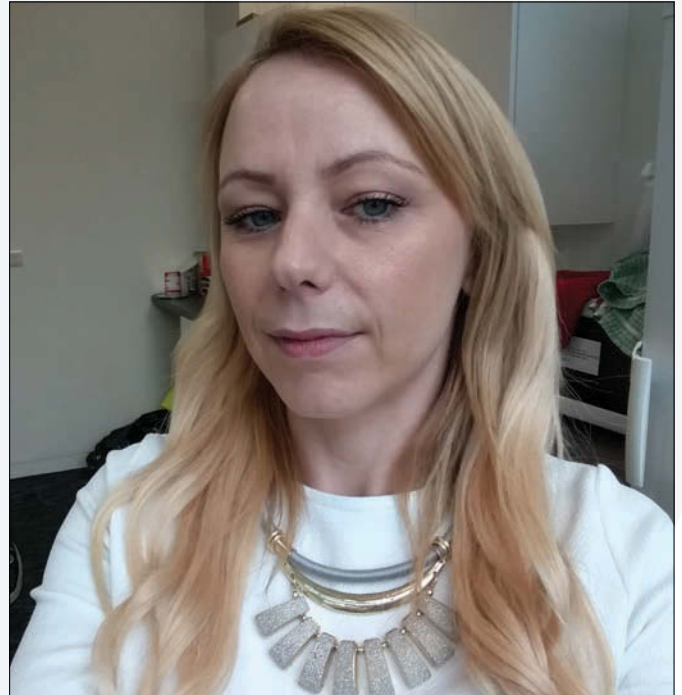
Google Nexus 5X

Well exposed, with good skin tones and lots of detail, the 5X is a great phone for those who love to take selfies. No skin smoothing is going on, something that won't please those who'd prefer their pores and blemishes to be hidden, but from a detail perspective, it's great.



Google Nexus 6P

The 6P's identical camera does a superb job of capturing detail and textures. It's also perfectly exposed and sharp. If anything, the skin tones are a bit too saturated, but it's one of the best here.



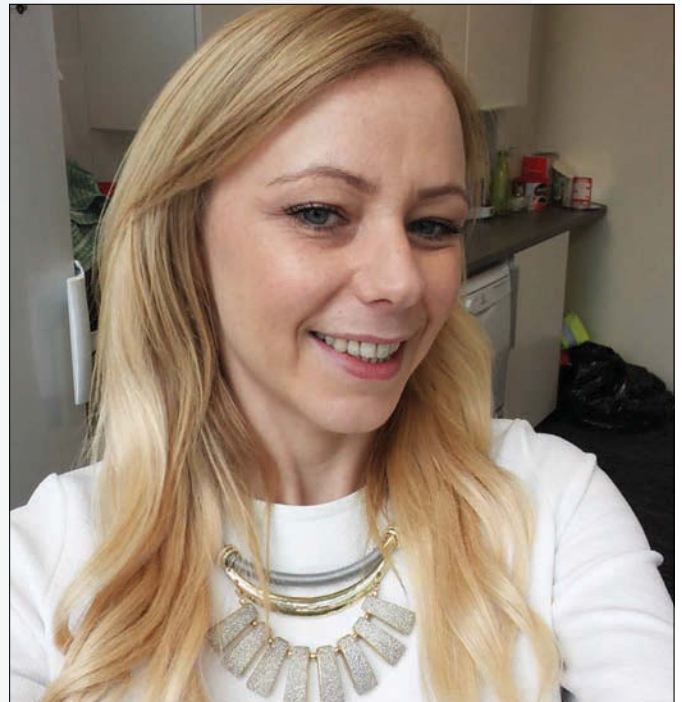
Motorola Moto X Force

Slightly underexposed, the Moto X Force's shot isn't overly flattering, and appears to be applying some skin smoothing, which we couldn't turn off. If there is an option, we failed to find it. As a consequence, detail is limited and a bit smudgy.



HTC One M9

The One M9's front camera is arguably better than its rear. This example is well exposed, detailed and sharp. Colours are a bit washed out, but arguably more natural than some here.



LG G4

The G4 defaults to a mirrored selfie mode, which is why the image is flipped. It's a good photo, though, with realistic colours. Detail is lacking, with what appears to be smoothing, despite us turning off the beauty mode.

SELFIE

(CONTINUED)



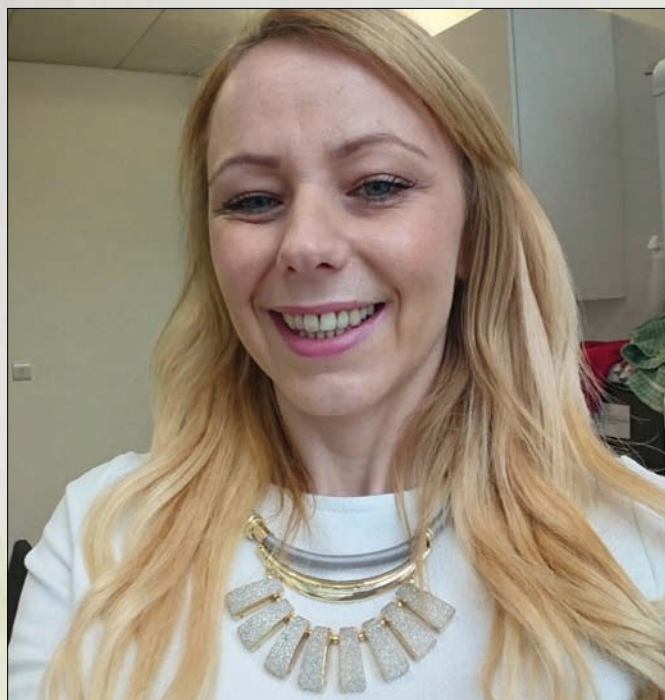
Samsung Galaxy S6 Edge+

There's too much processing going on in the S6 Edge+'s selfie. And that's despite turning off the beauty mode. Smoothing and sharpening are too evident for our liking. Some will appreciate it, but we prefer the detail you get from the Nexus 5X and 6P.



OnePlus 2

We're not that impressed with the OnePlus 2's effort here. Skin tones are a bit off and there's similar smoothing going on like the LG G4. Overall, a lack of detail.



Sony Xperia Z5

The Z5's photo has some posterisation - blocks of colour instead of smooth continuous tones - from the smoothing, which shouldn't have been present with any beauty mode disabled. The overhead light has thrown white balance off a bit, giving whites a green tint.

4K VIDEO

Obviously we can't print videos, so you'll have to head to the article on our website (tinyurl.com/hqkh9eu) or YouTube channel (tinyurl.com/hzhkj7j) to watch them - just make sure you click the cog and choose 2160p from the list. You won't see this option if you're

viewing on a mobile device, though. Of course, you will also need a 4K monitor in order to see the full detail on offer. However, you can still watch them on a monitor with a resolution lower than 3840x2160 to assess other factors, such as colour, focus and exposure.



Apple iPhone 6s Plus

The new iPhones differ slightly in their video capabilities, with the 6s Plus having the benefit of optical stabilisation. It makes a big difference, offering smooth and generally shake-free footage with a much more cinematic feel. Focusing is generally excellent thanks to those special focus pixels, and it only struggles to focus in very low light.

With the benefit of 4K, images have great levels of detail and there's the expected great colour reproduction. Only the audio recording lets the side down a little, but you can always connect a better-quality microphone.



Google Nexus 5X

The Nexus 5X delivers excellent quality video. Colour, exposure and white balance are good, and focus is fast, too. The lack of optical stabilisation is the big disadvantage, so you really need to keep the phone as still as possible. In terms of audio, the microphones aren't directional, so a lot of ambient noise is recorded.



Google Nexus 6P

No surprises with the 6P, and our comments for the 5X apply here, too. The electronic

image stabilisation isn't as effective as OIS, but it does help a little.



HTC One M9

It may shoot in 4K, but the lack of any stabilisation at all means the One M9's video footage is some of the worst here, and the difference is plain to see. Images also lack detail. The only plus is good stereo audio, but it's hardly a consolation.



Motorola Moto X Force

With good stabilisation, loads of detail and natural colours, the Moto X Force's videos are a pleasure to watch. This is bolstered by good audio, too. The camera is quick to adjust exposure when moving from light to dark or vice versa.



LG G4

If held relatively still, the G4 is capable of great video. But as good as the optical stabilisation is, footage suffers from the dreaded 'jello' effect when you move around too much. Colours and detail are generally good, but highlights can be blown out. Audio is pretty good, too.



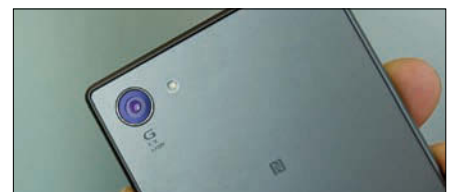
OnePlus 2

OnePlus didn't skimp on the camera in the 2: it has optical stabilisation. This, along with 4K recording, means it delivers video on a par with phones costing more than twice as much. While image quality is generally great, audio quality is not. There's strange clipping, as if the ambient noise was too loud. This may be fixable with a software update, but as it stands, the sound lets the OnePlus 2 down.



Samsung Galaxy S6 Edge+

As we saw back when we tested the Galaxy S6, the Edge+ - with the same camera - offers the same excellent detail levels, good colour and exposure. Stabilisation is effective if you really hold the phone still, but there's noticeable wobble or 'jello' when you're walking with it. Audio isn't perfect either. Overall, video quality is good, but other phones offer better stabilisation.



Sony Xperia Z5

The Xperia Z5's quality is generally excellent. Footage is packed with detail and stabilisation is also brilliant. Colours and exposure are good, and focus is fast. It only struggles - as most do - in low light.

See *PC Advisor* online to watch the videos:
tinyurl.com/opq2ghj



Verdict

So which is the best phone camera from the current crop in 2016? The short answer is that Samsung Galaxy S6 Edge and Google Nexus 6P have two of the best cameras going, and the iPhone 6s Plus isn't too far behind. Others have rated Sony's Xperia Z5 camera even higher, but in our experience it wasn't nearly as impressive, and we can only go by the photos we took on our sample phones in real-world conditions.

The longer answer is that there are many more considerations than simply evaluating a few test photos and videos to determine which is the best phone camera for you. With this number of phones, we could easily have spent weeks testing every last feature, but as we said right at the start, our aim was to find out which camera took the best pictures in a few different real-world scenarios in auto mode.

With that being the remit, the S6 Edge and 6P are pretty much tied for first place, even when you factor in the quality of their front cameras. Add video to the mix and the Samsung edges ahead thanks to optical stabilisation which the Google phone lacks.

However, while it can't compete on outright quality, we still highly rate the iPhone's camera. Other handsets may have technically 'better' cameras, but this doesn't always translate to better photos: they can be hit-and-miss as conditions change.

The iPhone, on the other hand, delivers consistently good photos - and video - in

just about any conditions with no need to adjust any settings. This reliability is exactly what you need in a phone camera that you depend on to capture the moment.

It's also important to look at the other camera features a phone offers, too. If you like to shoot in slo-mo, you're more likely to pick a phone that has the fastest frame rate at the highest resolution. Most are capable of only 120fps at 720p, but the iPhone 6s and Plus can both capture 240fps at this resolution, a significant difference.

Currently, all these flagships record 4K video at a maximum of 30fps, but many can shoot 1080p at 60fps, including the iPhones, Xperia Z5 and Galaxy S6 Edge. However, the Nexus 6P does not natively support 1080p at 60fps, which will be a dealbreaker for some.

For others, the front camera is just as important, and beauty modes can improve a quick selfie. The Nexus 6P and 5X have fantastic front cameras that deliver sharp, detail-filled photos. The S6 Edge and LG G4 have good beauty modes, but the Samsung has the better camera here.

If you're after a good camera but can't afford one of these phones, the OnePlus 2 comes to the rescue. The 64GB version costs £289, yet the camera stands up well against phones costing more than twice the price. It shoots in 4K, has OIS and delivers great quality in most situations. It can also capture slo-mo at 120fps in 720p, and the camera app offers time-lapse and panorama modes,

just as you'd expect. The bad news is that OnePlus' camera app doesn't let you record video at 1080p at 60fps.

It's no secret that the HTC One M9 has mediocre cameras, so we're hoping for good things from its successor, rumoured to launch in just a few weeks. The Moto X Force was a bit of a disappointment, too. Like previous Motorola phones before it, the Force looks fine on paper, but the reality is that photos just aren't in the same league as the Galaxy S6 Edge, Nexus 6P or iPhone.

Videos, though, were surprisingly good considering the lack of optical stabilisation, but this isn't enough to persuade many people to choose the Moto X over phones which take better photos.

Finally, the LG G4 has a pretty great camera, but our sample made a few mistakes that blotted its results sheet. Like the HTC, it's about to be superseded but while its replacement may have better cameras, it could still be a great phone to buy if prices drop even further: let's not forget that you can pick one up for a similar price to the OnePlus 2.

Price, of course, is only one of the other factors you'll be juggling when trying to pick the best phone. Battery life, screen size (and quality) and performance are probably all on your list. But if you're choosing purely on the basis of the camera, it's hard to beat the Galaxy S6 Edge, Nexus 6P and the iPhone 6s Plus. ☒

iPad & iPhone User magazine is the essential guide for all things iOS-related
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The magazine cover for 'iPad & iPhone user' Issue 104 features a red iPhone 6c as the central image. The title 'iPad & iPhone user' is at the top in white and grey, with 'ISSUE 104' in the top right corner. Below the title, 'iPhone 6c' is written in large red letters, followed by 'New 4in iPhone on the way' in white. A red circular badge on the right side of the cover contains the text 'DIGITAL EDITION ON ANDROID & iOS'. At the bottom left, a red banner with a white plus sign and the word 'REVIEWED' is positioned above the text 'iPad Pro Smart Keyboard'. At the bottom right, a circular inset shows a smartphone screen with a line graph, with the text 'EXPERT TIPS & TRICKS for iPad & iPhone users' overlaid. A black banner with the URL 'tinyurl.com/kg776m8' is placed over the circular inset.

iPad & iPhone user ISSUE 104

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Every issue is full of the latest app reviews, gaming, tutorials, buying advice & more



Some people choose a phone for its camera (see our group test on page 64), others for its performance. Here [Christopher Minasians](#) looks at which is the best phone for music, and round up the nine best-sounding phones you can buy in the UK in 2016

There's a huge number of smartphones out there, each offering a different hardware configuration. The same applies to audio chips: they vary between manufacturer, with some opting to utilise the audio codec found within the phone's chipset, while others prefer to use dedicated chip manufacturers.

To make this a fair test, we took all the smartphones into an isolated room, and tested them using a range of different head- and earphones at various price ranges. The majority of our testing was based mainly on the Harschacoustic SH-2 custom in-ear models and the modified Denon AH-D2000 headphones.

When it comes to listening to audio, it doesn't take an audiophile to hear the differences between smartphones. The only advantage an audiophile has over the average consumer is that they know what

to listen out for and have high-end audio equipment that allows them to distinguish the differences. This article isn't just aimed at audiophiles, though. In this comparison, we will reveal the variations we heard between the phones, which are applicable to everyone, using any gear.

The differences will, of course, be more distinguishable with higher-end equipment, and the same goes for the quality of the music recordings. With higher bitrate, sample sizes and higher-quality codec files, the differences become more distinguishable.

We conducted our tests using a variety of different songs at various recording qualities – our lowest sampled song was a 256kb/s, 44.1kHz MP3. This is the default music standard when buying MP3 audio tracks from resellers, such as Amazon or iTunes. Higher quality songs are harder to find, more expensive and are often a lot bigger in size.

Speaker quality

Each phone was tested at a safe level near our ears. We intentionally did not test the phones at a distance or maximum volume, where we might hear distortion or miss important sound quality traits.

We did, however, ramp up the volume of each handset to maximum before we started testing. We listened out for any distortion and then held the phones in our hands to test for any vibrations that might cause discomfort in prolonged periods of use. We did this as we know some like to hold their phone in their hand at maximum volume.

Alongside a short summary, we then broke down each of the phones' speakers by their physical positioning, loudness level (including distortion and vibration testing results), lows (including sub-bass and mid-bass), mids, highs and soundstage (including decay and tonality). For a full



Photography by Dominik Tomaszewski

list of the terms used in this group test
turn to page 89.

Internal sound quality

In order to test the audio quality from the headphone jack, we chose various ear- and headphones. We also tried to list the audio codec or chipset versions found within the phones. This was often hard to find, especially with those models that don't have a separate codec interface installed and were using the on-board SoC (system on chip) audio module.

In order to make the group test useful for commuters, we've included the listening level at which the tests were conducted. This is not an indication of the level at which you should be listening, but rather the levels we selected for our testing. This allowed us to compare the various phones at the same perceived output level.

For example, some phones had to be pushed to their full volume, whereas others were happily outputting the same level of audio, but at 60 percent of their maximum. This means some phones are louder than others, and their drivability (audio power output) is better than those that had to be cranked up to be heard.

To make the internal audio reviews even more relevant to those that plug their phones into amplifiers (such as a car's aux input jack), we tested to see if we could hear any interference or distortion when the phones were in an idle state. Some models are known to cause audio interference and problems when their processor is clocked down to a low power-saving mode; for example, when the phone's screen is turned off. All the audio tests were performed without an amplifier, but for the amp test we used the DigiZoid ZO2 v2.3 with high-gain

mode enabled with bass contour set to zero. The amplifier was connected to the phones with a 3.5- to 3.5mm Custom Art silver braided interconnect cable.

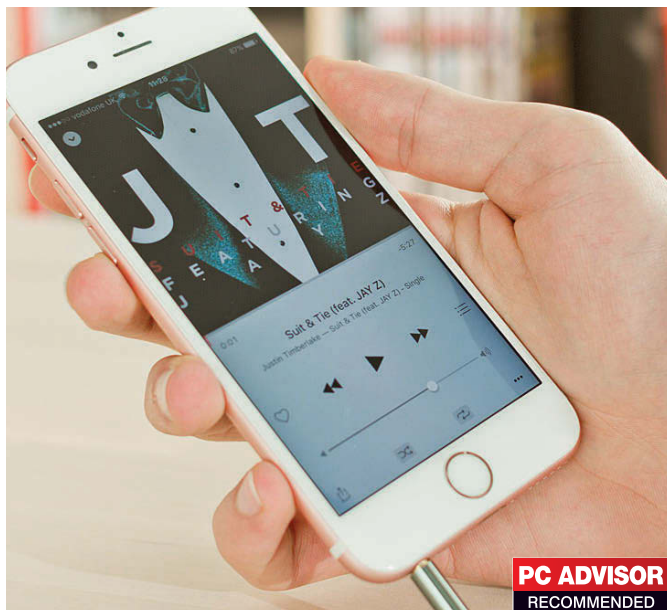
Despite some phones having the same audio chipset, they can sound different. This comes from the manufacturers' tinkering and optimising the audio chipsets themselves via the low-level hardware coding that is performed on the audio chips.

Each phone review is split into several sections, including internal audio chip, amp test, and loudness level.

Finally, we know that output impedance is an important subject among audiophiles; however we didn't find any phone to have overly large impedance. We estimate the average output impedance per phone to be between one- to five ohms, but don't have the hardware equipment to back up this claim.

APPLE iPhone 6s

From £539 inc VAT • apple.com/uk



Build	★★★★☆
Features	★★★★☆
Performance	★★★★☆
Value	★★★★☆
Overall	★★★★☆

PHONE SUMMARY

We're impressed by what the iPhone 6s has to offer, especially the 3D Touch technology. If it catches on, 3D it will change how people interact with their iPhones, both in terms of browsing the web and social media, as well as when gaming. The overhaul of the camera is a welcome addition, too. This works well with Live Photos, a new software feature that captures a gif-like video, complete with audio when you take a photo - 1.5 seconds before the photo was taken, and 1.5 seconds after. It doesn't just have impressive new features, the boosted internals provide us with a much faster phone than we're used to, and tasks that would take seconds on our 6 Plus took a split second on the 6s. We're excited about the technology the 6s offers, and what it means for future smartphones. [Full review at tinyurl.com/zu5tpce](http://tinyurl.com/zu5tpce)

Speaker quality

The iPhone 6s provides a decent sound, but is let down by its mids and the overall volume. We would have liked to hear it project more, with a bigger emphasis on the mids. Its one-speaker design is also not suited to those who hold their phone in their right hand.

Speaker's position: The single downward-firing speaker is located in the bottom righthand corner. Its placement is poor if you hold your phone in your right hand, and sometimes means that audio is suppressed due to the speaker's positioning.

Loudness rating: The 6s isn't very loud, which means that listening to it in a crowded- or loud environment might not be feasible. On the plus side, the audio wasn't distorted. **Score: 7.5/10**

Lows: The iPhone's sub-bass response is good, while its mid-bass is well presented and has a decent slam, though we feel the latter doesn't have the right amount of control to it.

Mids: The mids are affected by the low-end response and are in fact V-shaped, and therefore are a little recessed. This is a shame as the internal audio sounds flat (a good thing in this context), but unfortunately this wasn't applied to its external speaker.

Highs: The highs are a little off, which is disappointing, but natural considering the phone's emphasis on low-end frequencies.

Soundstage: Its soundstage is decent where its instrument separation is amazing. Despite only having one small speaker, we were impressed to hear that its positioning was accurate.

Internal sound quality

The iPhone 6s produced a fantastic overall sound, where its mids and highs were absolutely phenomenal. Indeed, it is a narrow second in the standings of the best sounding phone of 2016 and was beaten to the top spot by the Samsung Galaxy S6 (page 87), which had a much better soundstage reproduction and was less prone to interference and distortion.



Internal audio chip: Apple/Cirrus Logic 338S00105 Audio chip and Apple/Cirrus Logic 338S1285 audio codec.

Amp test: We found there was a slight bit of interference and small static sounds that were audible when the screen was turned off, which was disappointing.

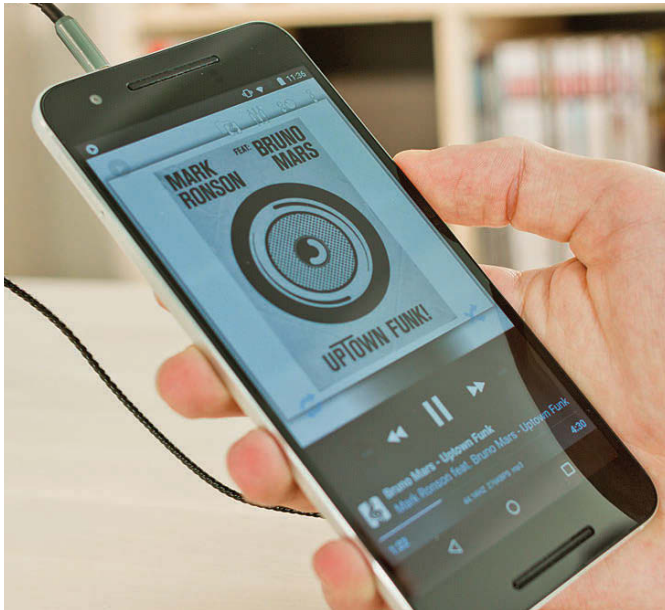
Loudness level: We found the iPhone 6s to be sufficiently loud for most people. If, however, the phone were to be used with headphones that require more power, an external amplifier would be required to fully drive them. **Score: 75- to 80 percent**

Lows: The sub-bass doesn't extend that well, but the mid-bass is well controlled and has the right amount of impact.

Mids: The mids are well presented and have an accurate tonality to them. In fact, the realism being portrayed in the mids is one of the best of all the phones we tested. They did not feel recessed nor pushed back and had just the right amount of emphasis to them.

Highs: Apple has done a fantastic job here with the highs. The quality portrayed in the highs is spectacular. The iPhone 6s has the best high-tone frequency response out of all the phones we tested. It extends well, and has the right amount of sparkle. This means they were marginally sibilant, but that didn't cause us any problems.

Soundstage: We found the soundstage lacked both width and depth, meaning the music didn't feel as engaging as we would have liked. The decay also left us wondering why the 6s sounded different from most of the other phones we tested. It had some background noises that were very hard to hear, albeit present.

GOOGLE NEXUS 6P**£449** inc VAT • google.co.uk

Build	★★★★★
Features	★★★★★
Performance	★★★★★
Value	★★★★★
Overall	★★★★★

PHONE SUMMARY

Originally, Nexus phones stood out for being excellent value at a price that was low, though not the lowest. They weren't an alternative to flagship phones, but had the advantage of running stock Android and getting the next version more quickly. The 6P is, however, not only a flagship model, but is arguably the best Android phone you can buy at the moment. It won't suit everyone due to its size, nor those looking for a phone with dual-SIM slots or a removable battery. And there's no support for wireless charging either. But the excellent screen, front-firing speakers, quick charging, great cameras, speedy performance and Android Marshmallow add up to make this a phone that's a pleasure to use. And yes, it's also cheaper than its rivals, so unless you think it's worth shelling out extra on the Samsung Galaxy S6 Edge+ or Apple iPhone 6s Plus, the Nexus 6P is the one to buy. **Full review at tinyurl.com/nabsv4e**

Speaker quality

The Nexus 6P offers loud, albeit a little uncontrolled, audio. The dual front-facing speakers aid the overall experience of watching and listening to content on the phone, though we were disappointed with the distortion of the speakers at maximum volume.

Speaker's position: The dual front-facing stereo speakers are excellent for watching movies or playing games on your phone.

Loudness rating: Google's handset is the loudest phone we tested. With its dual front-facing design, the speaker gets loud and provides a great stereo sound. It also came as no surprise that the speakers are the largest on any of the phones we tested, simply due to the size of the 6P's screen. It does, however, very slightly distort at maximum volume, where the speakers become less refined and accurate. Fortunately, no vibrations are present at maximum volume, which was a pleasant surprise. **Score: 9.5/10**

Lows: The sub-bass is present, but doesn't really extend low enough for our liking, which is unfortunate given that its mid-bass has decent impact and is well controlled. However, the mid-bass doesn't have much presence and sounds slightly subdued.

Mids: The reproduction of the mids is very good and has great imaging. This was the highlight of the phone's speaker output.

Highs: The highs are very slightly rolled off at the top end, but provide a great sparkle and extension.

Soundstage: The soundstage is well presented, mainly because of its dual-speaker design, where the reproduction of the songs are wide rather than narrow, which is a good sign. The soundstage could have

been a little better in its depth. The instrument separation is good but lacks that little bit of finesse, while the tonality is well presented and its decay shines through.

Internal sound quality

The 6P is easily one of the best sounding phones out there, with an amazing mid and high-range frequency response. Unfortunately, it's let down by the slight interference when used alongside an amp, though you need to use one to get the best out of this phone.

Internal audio chip: SoC Qualcomm MSM8994 Snapdragon 810. We believe that it uses the Qualcomm WCD9330 audio codec.

Amp test: There was a very small amount of distortion, with a little bit of hissing while on idle. After around 10 seconds of the phone being idle, we heard a clicking and popping sound.

Loudness Level: We had to turn the volume up to maximum to get the best out of the 6P, which makes it a poor choice for anyone using their phones in a loud environment. **Score: 90- to 95 percent**

Lows: The sub-bass doesn't extend much and is unfortunately cut-off, whereas the mid-bass is really well presented by having a fantastic control and a good slam.

Mids: The mids are well presented, where they convey a great reproduction. We found the mids to sound clean, which was a surprise in comparison to most of the other phones out there.

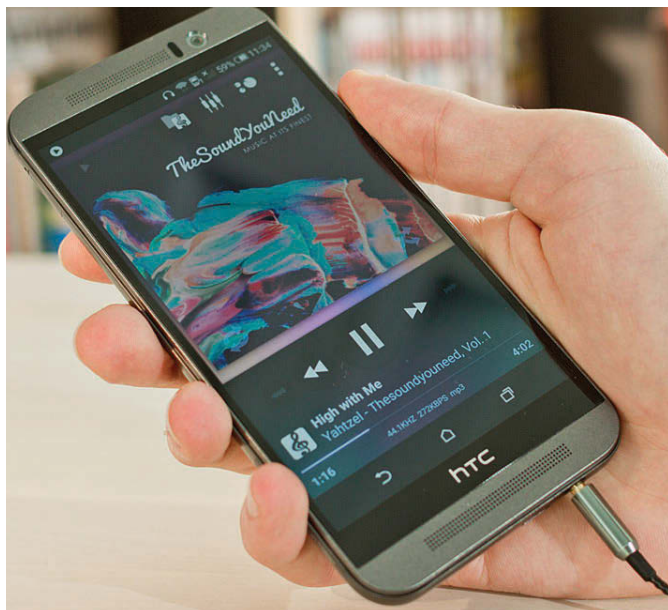
Highs: The highs were also well presented, where they weren't rolled off and were well extended. It should be noted that the Nexus 6P did have a little bit of sibilance, which wasn't a problem for us, but with ear- or headphones that are more sensitive, it could cause problems.

Soundstage: The soundstage is absolutely sensational, where we found the instrument separation to be top class for a smartphone and the tonality to really complement the phone's overall sound signature. We found the imaging to be really fantastic.



HTC ONE M9

£579 inc VAT • htc.com/uk



Build	★★★★★
Features	★★★★★
Performance	★★★★★
Value	★★★★★
Overall	★★★★★

PHONE SUMMARY

The HTC One M9 is a genuinely desirable smartphone, with the best design and build available in Android land, even with Samsung upping the ante. It's good to see the powerful Snapdragon 810 and more memory, though some key hardware remains the same, meaning M8 users are unlikely to be tempted to upgrade - and the old model is now an attractive buy at around £350. The fact the Samsung Galaxy S6 (page 87) is the same price with more impressive specs is also not a good thing for HTC. **Full review at tinyurl.com/z8gskha**

Speaker quality

The One M9's audio quality is great, though it lacks volume. BoomSound, which HTC developed alongside Dolby Audio, is enabled by default and we weren't able to disable it entirely. We therefore did our testing using the Music Mode, as we felt it better reproduced music.

Speaker's position: The dual front-facing dual stereo speakers are excellent for watching movies or playing games.

Loudness rating: The One M9 was not as loud as we were expecting, and is much lower than the Google Nexus 6P and Marshall London, which both have dual front-facing speakers. On the plus side there is no distortion at maximum volume, though there are slight vibrations on the backplate of the phone. **Score: 7.5/10**

Lows: The sub-bass is decent, with an average extension for a phone's speaker, but unfortunately the sub-bass sounds cut-off. Its mid-bass slam is weak and slightly uncontrolled.

Mids: The mids are average, and the audio is a little recessed. Nevertheless, the M9 offers a decent reproduction of the mids.

Highs: The highs extend well and provide a good sparkle to the phone's overall sound signature.

Soundstage: Its soundstage is good, but lacks a little depth, which ties into our similar findings to the Google Nexus 6P. On the plus side, due to its dual speaker design, its width is well presented.



Internal sound quality

The One M9 provides a decent internal audio sound reproduction, but is slightly let down by its average low-end performance and its soundstage. Overall, we feel the HTC is nothing to get too excited about, but it offers a decent internal output.

Internal audio chip: SoC Qualcomm MSM8994 Snapdragon 810. We believe that it uses the Qualcomm WCD9330 audio codec.

Amp test: We recorded a very small amount of hissing and interference when the HTC One M9 was used alongside an amplifier. The hissing and interference was hard to hear though, and we felt it was negligible for most users.

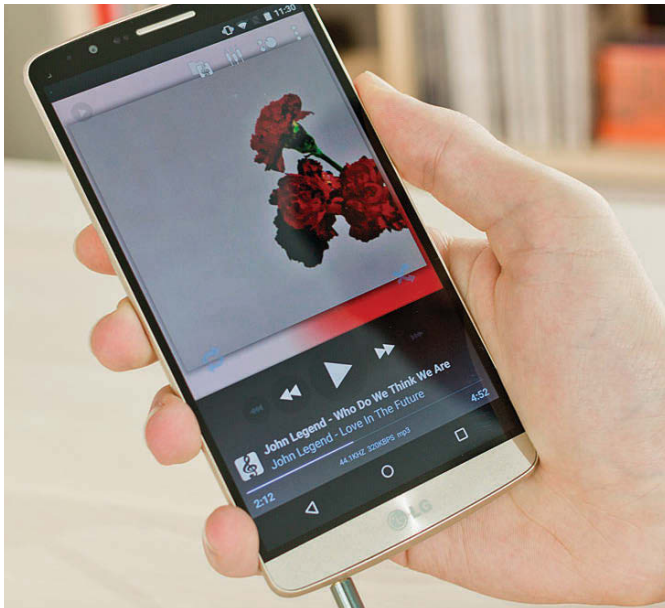
Loudness level: We found the HTC One M9 to be sufficient in loudness for most people, however if the phone were to be used with headphones that require more power, an external amplifier would be required to fully drive them. **Score: 75- to 80 percent**

Lows: We found the sub-bass to reasonably extend well, but it cuts off in the lower sub-bass regions. Despite the One M9 portraying a decent mid-bass slam, we feel it could have been improved with a little more control.

Mids: Its mids are well presented, but due to the slight hiss and distortion there is a slightly odd reproduction that is conveyed in the mid-range frequency.

Highs: The highs are very well presented and extend extremely well. We found them to provide a good amount of sparkle, which did lead them being a little sibilant.

Soundstage: Its soundstage is average and we found it to portray a duller, more boring sound signature. The HTC One M9 offers a decent decay, but due to a slight bit of distortion has some odd blimps when playing high-tone frequencies. We feel its overall soundstage could have been a little wider and slightly deeper sounding to provide a better overall audio listening experience.

LG G3**£259** inc VAT • lg.com/uk

Build	★★★★★
Features	★★★★★
Performance	★★★★★
Value	★★★★★
Overall	★★★★★

PHONE SUMMARY

When the LG G3 came in at under £500 we were impressed. A year on and a phone that packs amazing features, including a Quad HD display and a camera with a laser auto focus, is one of the bargains of the market. The handset is surprisingly small considering the 5.5in display and we like the more premium design. It's another winner from LG, and well worth your consideration. **Full review at tinyurl.com/gu4e9xc**

Speaker quality

We were impressed by the G3's overall volume and its high-end frequency extension. However, due to the design, the speaker's performance is limited - when placed normally on the table with its screen facing up, the LG's overall loudness and clarity is reduced.

Speaker's position: The single backward-firing speaker is located at the bottom lefthand corner of the phone, which means audio is affected if you hold the phone in your right hand. On the plus side there was no distortion, but instead there were small vibrations present through its metallic body design.

Loudness rating: When the screen is positioned upward, it blocks the speaker's output, due to the design of the backplate being curved. This means the volume is reduced to **7.5/10**. If, however, the display is face down, the LG G3's single backward-firing speaker achieves an impressive **8.5/10**.

Lows: We found the lows have a slight sub-bass extension, where its mid-bass is very faint and not that well controlled. This means the G3's overall low-end reproduction is rather disappointing.

Mids: Its mids take advantage of the weak mid-bass slam and are surprisingly good, with a good reproduction and sense of realism.

Highs: The LG G3's highs are its standout feature - they are really well presented and -extended at the top end.

Soundstage: Its soundstage could be a little wider, but on the plus side has a good depth to it, which equates to a fantastic tonality and instrument separation.

**Internal sound quality**

The G3 suffers from huge internal audio problems, with distortions, interference and random clicking sounds when a 3.5mm jack is plugged in. The audio is therefore extremely hampered by the poor performance of the audio jack. Despite this, the LG has a decent reproduction of the mid-bass and -range. Overall, out of the phones we tested, the LG G3 was one of the worst we came across.

Internal audio chip: SoC Qualcomm MSM8974AC Snapdragon 801. We believe it uses the Qualcomm WCD9320 audio codec.

Amp test: The LG G3 suffers from massive interference. We were extremely disappointed with its problems and furthermore found that the phone produced a double-clicking noise each time a 3.5mm jack is plugged into the phone. This frustrating and annoying feature cannot be disabled and becomes a distraction when plugging in a jack into the phone. Furthermore, we found the phone produces huge computer hard-drive sounds when used alongside an amplifier.

Loudness level: In our tests, the LG G3 was able to drive everything we threw at it, which is impressive considering it's only a smartphone. **Score: 60- to 65 percent**

Lows: The bass is really divided and we feel the sub-bass is not well extended and is cut-off. With the mid-bass, however, it produces the right amount of slam and provides a good quality reproduction.

Mids: The mids are a little recessed and slightly pushed back, but nevertheless are well portrayed.

Highs: The G3's highs are decent, but we didn't provide the right amount of sparkle to our music. We feel the highs lack a little bit of life and extension (due to being rolled off) at the top-end.

Soundstage: Its soundstage is a little closed, where we felt the songs in our tests were being slightly suffocated and didn't have enough room to breathe. With that said, we feel the tonality alongside the decay is accurate and well presented.

MARSHALL LONDON

£399 inc VAT • marshallheadphones.com



Build	★★★★☆
Features	★★★★☆
Performance	★★★★☆
Value	★★★★☆
Overall	★★★★☆

PHONE SUMMARY

Focusing on core specs, the Marshall isn't a very good deal at all. You get the kind of hardware (in some cases worse) available on phone less than half the price. However, this isn't the point of the phone. Buying the London is all about the brand, the style and music, and on these fronts it delivers in amp-shaped bucket loads. In fact, Marshall has made the coolest phone we've ever seen. **Full review at tinyurl.com/jfaa3p3**

Speaker quality

The London really impressed us, but had tough competition from the other flagship phones. We feel it just has the edge, mainly due to its speaker design and its fantastic low-end response, which is phenomenal to hear in such a small set of speakers.

Speaker's position: The dual front-facing stereo speakers are great for watching movies or playing games on your phone.

Loudness rating: The Marshall has a fantastic set of external speakers, and the sound it produces is loud but clear. We did find the audio to distort very slightly at maximum volume though, and when the speakers were on full blast we felt small vibrations through the phone's body. **Score: 9/10**

Lows: The lows of the Marshall speakers are easily the best here. The sub-bass is not only present, but extends very well. Its mid-bass response is also phenomenal and has a great slam.

Mids: The mids are very well presented with a very lean and precise reproduction. The mids were slightly affected by the mid-bass response, as the mids were slightly pushed back, therefore making the Marshall London sound a little recessed and V-shaped.

Highs: The highs are a little rolled off at the top end, but they have enough sparkle and clarity to make listening enjoyable.

Soundstage: The London's soundstage feel unique, mainly due to the sound signature that is presented through the phone's speakers. The sound has an authentic, rock 'n' roll feel to it. The actual soundstage itself is nice and wide, due to its dual stereo speaker



design. The speakers also offer a reasonably good depth to them, which add to the overall experience.

Internal sound quality

The London produces audio, and the sound is full-bodied and fun sounding. It performs at a very high standard and we feel it's slightly warmer sounding than the Samsung Galaxy S6, which takes our top spot in this phone comparison. This comes down to both phones utilising the Wolfson Microelectronics chips.

Internal audio chip: Wolfson Microelectronics WM8281 DAC.

Amp test: We didn't encounter any problems when we connected the Marshall London to an amplifier.

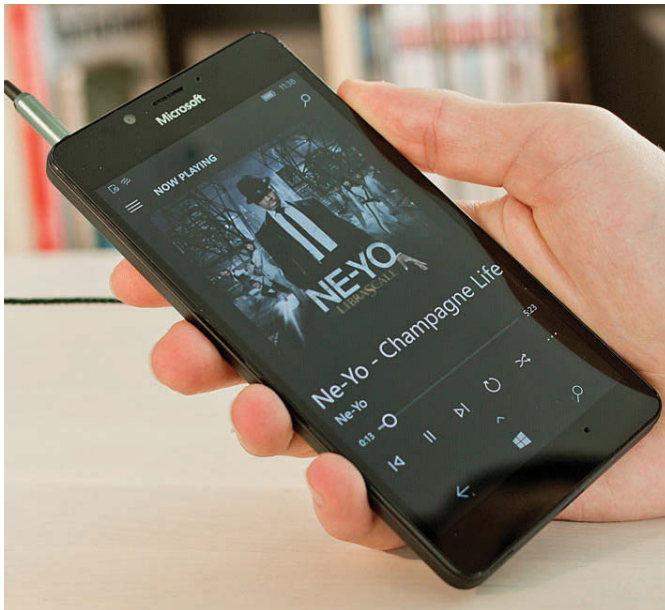
Loudness level: We feel the London lacks a little in loudness for most people, especially if the phone is used with headphones. The phone's speakers require more power from an external amplifier to fully drive them. **Score: 80- to 85 percent**

Lows: The sub-and mid-bass reproduction is extremely good. Indeed, it reproduces the most desirable basshead sound out of all the phones, with a great sub-bass extension and a strong mid-bass slam.

Mids: Due to the emphasis on the lows, the mids take a hit and sound recessed and slightly pushed back. This creates a V-shaped sound signature, which is nice for rock and R 'n' B songs, but not desirable for classical music, where there is a lot more emphasis on the mids.

Highs: The highs extend well and provide a nice sparkle, but are a little rolled off at the top end.

Soundstage: The soundstage is well presented, though we feel the instrument separation and tonality could be slightly better presented. It was interesting to hear the sound signature to be presented in a Rock 'n' Roll fashion, which led itself to provide a warm and fun sounding phone. This does have its downside, where the output sound is neither accurate nor neutral sounding.

MICROSOFT LUMIA 950**£449** inc VAT • microsoft.com/en-gb

Build	★★★★☆
Features	★★★★☆
Performance	★★★★☆
Value	★★★★☆
Overall	★★★★☆

PHONE SUMMARY

Windows 10 has arrived on smartphones and we're not exactly blown away. Loyal Windows and Windows Phone users will appreciate features such as Universal Apps, and while Continuum appears to be a real wow, it requires a lot of extra equipment. The OS is buggy, too. The Lumia 950 itself offers some decent hardware, namely the screen, inside an uninspiring design. Unless you're set on Windows, there is a lot better on the market and for less money. **Full review at tinyurl.com/z3cqecw**

Speaker quality

The Microsoft Lumia 950 has an average speaker. Its strongest asset is its mids reproduction, while its weakest is its lows.

Speaker's position: The single backward firing speaker doesn't hinder its loudness. This comes from the design of the camera at the back of the phone, which sticks out slightly, preventing the speaker from being blocked off.

Loudness rating: The Microsoft Lumia 950 has a clear loud sounding speaker, and despite facing backward is loud no matter which way the screen is facing. There are also no audible distortions or vibrations felt on the phone. **Score: 8/10**

Lows: Unfortunately, we didn't hear any sub-bass extension, and its mid-bass also has poor control and lacks any impact. It was disappointing to hear no emphasis made on the low-end frequencies.

Mids: The mids are well presented and accurate sounding, which comes from the phone having a very subdued mid-bass response.

Highs: The speaker is well extended highs that provide a good sparkle to music.



Soundstage: The soundstage is well represented, and alongside the tonality and reproduction make the experience a little better. We found the instrument separation to be good, but feel there is still room for improvement.

Internal sound quality

The Microsoft Lumia 950 has a decent internal audio output, but didn't really leave us excited, due to its rather dull, unimaginative sound. Plus, the phone also suffers from crackling issues when used alongside an amplifier, which doesn't help its performance.

Internal audio chip: SoC Qualcomm MSM8992 Snapdragon 808. We believe it uses the Qualcomm WCD9330 audio codec.

Amp test: The Lumia 950 suffers from crackling noise and small pulse sounds, while remaining on the lockscreen.

Loudness level: The Lumia 950 is sufficiently loud for most people, however if the phone were to be used with headphones that require more power, an external amplifier would be required to fully drive them. **Score: 75- to 80 percent**

Lows: The sub-bass is a little rolled off, which is a shame as its mid-bass is well presented and has a nice controlled slam.

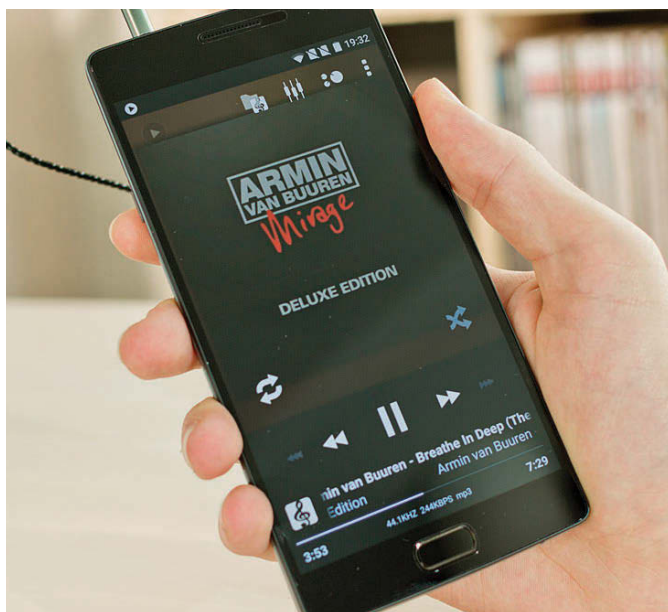
Mids: The mids are accurate, with it sounding realistic and not too pushed back. We found they could have been a little better in their reproduction, but are satisfied with the overall tonality.

Highs: Its highs extend well and perfectly complement the overall sound signature. We found that with its extension and little bit of sparkle, music was a little more enjoyable to listen to.

Soundstage: We found the soundstage to be a little closed, which hinders the performance of the sound. On the plus side, we found the instrument separation to be absolutely fantastic, and alongside a great decay, creates a good sense of depth and width to the overall sound quality.

ONEPLUS 2

£239 inc VAT • oneplus.net



Build	★★★★☆
Features	★★★★☆
Performance	★★★★☆
Value	★★★★☆
Overall	★★★★☆

PHONE SUMMARY

The lack of NFC, a microSD card slot, a removable battery, and quick- and wireless charging means the OnePlus 2 is not a flagship killer. It does have some killer new features though, including USB Type-C, 4G dual-SIM support and some powerful hardware. At £239, it's an unrivalled deal. Full review at tinyurl.com/h22Lvcw

Speaker quality

The OnePlus has one of the weakest speakers out of all the phones we tested. We're satisfied with the high-end frequencies it offers, but feel its lows and mids reproduction could be vastly improved.

Speaker's position: Despite the position of the single downward-facing speaker, the audio was not affected by any sort of hand grip. This is because the speaker is slightly more centred.

Loudness rating: The OnePlus 2 is the quietest phone here, which is a shame. On the plus side, it has neither distortion nor any vibrations that could be heard or felt at maximum volume. **Score: 6/10**

Lows: Its sub-bass extension is almost nonexistent, while the mid-bass is very weak and doesn't have much impact or conviction.

Mids: The mid-range on the OnePlus 2 is not that impressive, where it has a decent reproduction and reasonable level of accuracy.

Highs: Its highs are well presented, where they provide a good extension in the high-end frequencies with a fantastic sparkle. It should be noted that the highs produce a slightly sibilant sound, though this didn't bother us when it came to our audio tests.



Soundstage: The soundstage has a good depth and width to it, which adds a lot to the overall listening experience of the phone's speakers.

Internal sound quality

The doesn't deliver a good overall sound and is at the bottom of our list for internal audio quality. It's worth noting that the MaxxAudio settings are hidden within the settings of the phone and are only accessible to be disabled when audio is playing. We fully disabled every adjustment and equaliser setting before conducting our tests.

Internal audio chip: Qualcomm WCD9330 Audio Codec with NXP TFA9890 audio amplifier.

Amp test: The OnePlus 2 suffers from interference when used alongside an amplifier. It also produces a small ticking noise when left on idle and a whirring noise in use. This was disappointing as we were expecting a crackle-free output after having partnered with MaxxAudio to create some of their software-side tweaks.

Loudness level: In our tests, the OnePlus 2 was able to drive everything we threw at it, which is impressive considering it's only a smartphone. **Score: 60- to 65 percent**

Lows: We found the sub-bass to not really extent that well and felt somewhat cut-off. Despite having a decent amount of mid-bass slam, we found the mid-bass to be also disappointing, as it lacked control and precision.

Mids: Due to having a bit of a mid-bass slam, we found its mids to feel a little recessed and pushed back. We were disappointed not to hear it excel in the mids department.

Highs: The OnePlus 2's highs extend well, but are rolled off at the top-end frequency.

Soundstage: We found the soundstage sounded closed, where we felt the phone's internal audio had very little room to breathe. We were also disappointed by the imaging and positioning.

SAMSUNG GALAXY S6**£599** inc VAT • samsung.com/uk**PC ADVISOR**
RECOMMENDED

Build	★★★★★
Features	★★★★★
Performance	★★★★★
Value	★★★★★
Overall	★★★★★

PHONE SUMMARY

Samsung's Galaxy S6 is fast, well built, has a gorgeous screen and the software isn't overly intrusive. The fingerprint scanner is vastly improved, the heart-rate scanner a potential draw for some users, and the wireless- and fast charging are welcome inclusions. It's a shame we've lost the removable battery, waterproofing and microSD support, but these are all things we can live with. **Full review at tinyurl.com/h42Lc9k**

Speaker quality

We found the Galaxy S6 produced a mediocre external speaker sound, which left us wanting more. We feel it would really benefit from having a downward-firing dual stereo design, or moving to dual front-facing speakers.

Speaker's position: The Samsung's single downward-firing speaker is located at the bottom lefthand corner of the phone. This meant audio was affected when we held the S6 in our right hand.

Loudness rating: The Galaxy S6 isn't that loud, but nor is it unpleasantly quiet. It sits somewhat in the middle of how the other smartphones performed. There are neither distortions nor vibrations present at its maximum volume. **Score: 7.5/10**

Lows: The sub-bass is almost nonexistent, while the mid-bass has a very small impact and little control. We feel the lows could have been drastically improved by Samsung.

Mids: The mid-range on the Galaxy S6 is not that impressive, where it has a decent reproduction and reasonable level of accuracy. We felt that at times the phone's speaker would sound a little recessed and V-shaped.

Highs: The highs on the other hand are good and have a great level of extension. This provides an excellent sparkle and a pleasant experience whilst listening to vocals.

Soundstage: Its soundstage is well presented, especially with its instrument separation. Coupled with its sound reproduction, the Samsung has an accurate and impressive soundstage.

**Internal sound quality**

The Galaxy S6 has a fantastic internal audio output. The Wolfson WM1840 provides it with its unique meaty sound signature, while remaining accurate and not overly V-shaped in its sound reproduction. The Samsung combines a little bit of every frequency, which works very well. It definitely wasn't the best mid or high-tone frequency reproduction we tested, but the way it combines them all led us to give the Galaxy S6 a Recommended award.

Internal audio chip: Wolfson Microelectronics WM1840 DAC.

Amp test: When used alongside an amplifier, we were able to hear very minimal interference, which occurred when on idle.

Loudness level: The Galaxy S6 was able to drive everything we threw at it. It was the most powerful of all the phones in this group test. **Score: 55- to 60 percent**

Lows: The Samsung has a fantastic sub-bass extension and a great mid-bass slam. We feel the mid-bass slam is slightly uncontrolled, but its overall reproduction of the lows is fantastic.

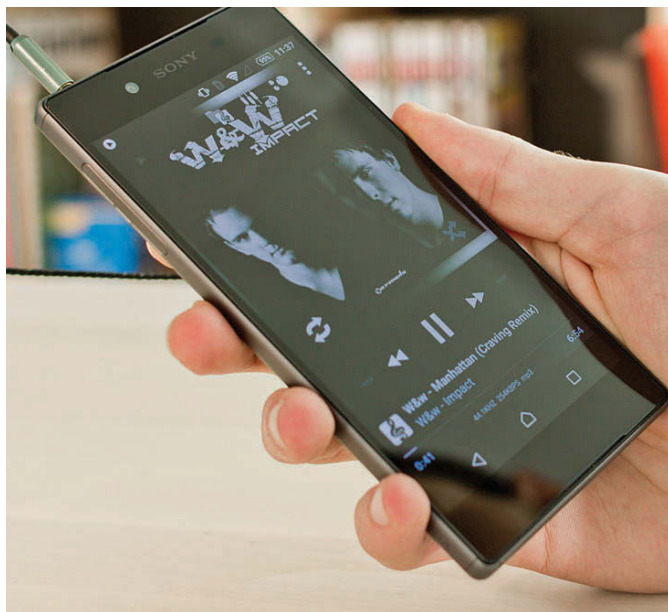
Mids: Its mids are a little pushed back, but by not such a great degree. We feel the mids are a little recessed and create a V-shaped sound to the phone's internal output. The Galaxy S6 has a warm and slightly more fun sound to it in comparison to the iPhone 6s or the Nexus 6P, which were both excellent in their mid-range reproduction.

Highs: We found the highs to extend well, and provide a fantastic sparkle to the music we were listening to. Furthermore, unlike other phones that had a good high-tone response, but sounded a little sibilant; we found the Galaxy S6 extends well, without being sibilant, which was a pleasant surprise.

Soundstage: As stated above, we feel the sound signature is a little V-shaped. We found the instrument separation and tonality to be good, but what really stands out is its accurate reproduction of the music, which was extremely well received.

SONY XPERIA Z5

£549 inc VAT • sony.co.uk



Build	★★★★★
Features	★★★★★
Performance	★★★★★
Value	★★★★★
Overall	★★★★★

PHONE SUMMARY

There's no doubt that the Xperia Z5 is a solid flagship smartphone from Sony and an improvement on the Z3+. We certainly like the new frosted glass rear cover and the addition of a fingerprint scanner to the slim power button. Once again, the camera is great but there's tough competition out. Once the price drops, which it will, this will be a great option for those of you looking for a waterproof flagship with a microSD card slot but we'd like the Full HD screen to be Quad HD and the design just isn't as nice in the hand compared to rivals. [Full review at tinyurl.com/je3a4ob](http://tinyurl.com/je3a4ob)

Speaker quality

We're happy with the performance of the Sony's speakers, as they produced a nice stereo sound that had a good emphasis on the mids and highs. Unfortunately, the Xperia Z5 falls short in the low-end department, where its bass is almost nonexistent. We're very impressed with its soundstage reproduction and in our tests it did a fantastic job in this department.

Speaker's position: We enjoyed listening to its speakers due to its front-facing position. This makes it excellent for watching movies or playing games on your phone.

Loudness rating: The Sony isn't that loud, and leans towards the quiet side. It sits in the bottom half of how the other smartphones performed. During testing, there were noticeable vibrations at the back of the phone due to its full metal construction. On the plus side there was no distortion at maximum volume. **Score: 7/10**

Lows: We feel the lows are the Xperia Z5's weakest link, with almost no sub-bass extension and very little mid-bass presence. When compared to the other phones that had very little mid-bass presence, the Sony at least had a good control in its low-end tones.

Mids: The mids are very well presented, where they sound forward and are accurately represented. We're impressed by its mids, which are aided by the lack of a mid-bass presence.

Highs: The highs are well extended and provide a good sparkle to music. We were impressed by how Sony was able to get the right level of high-end frequencies, without making them sound sibilant.



Soundstage: The soundstage is very good and is especially impressive due to its instrument separation, which is fantastic. The tonality and imaging is truly amazing, too.

Internal sound quality

We found the Xperia Z5 neither good nor bad. It sat in the middle, due to its disappointing soundstage but impressive mids and highs. We feel Sony has done a decent job in tuning all the frequencies for a majority of listeners, but that the mids are a little artificially boosted, which results in a somewhat unnatural and dull sound.

Internal audio chip: SoC Qualcomm MSM8994 Snapdragon 810. We believe it uses the Qualcomm WCD9330 audio codec.

Amp test: During our tests, the Sony produced crackling and popping sounds when used alongside an amplifier. We also noticed a pulse sound that occurs when the phone is connected via a 3.5mm input.

Loudness level: We found the Xperia Z5 to be sufficiently loud for most people, however if the phone were to be used with headphones that need more power, an external amplifier would be required to fully drive them. **Score: 75- to 80 percent**

Lows: Its sub-bass is a little cut-off, which is a shame as its mid-bass is well presented, despite being a little uncontrolled.

Mids: The Xperia Z5's mids are impressive, where we feel the mids are being slightly boosted and have a good frequency. However, we did find it sounds a little artificial in its reproduction.

Highs: The phone's highs extend well, and complements the soundstage as the sparkle has a nice resonance with the Sony's internal audio output.

Soundstage: We found the soundstage to be lacking, due to it being a little closed in its reproduction. The sound signature of the phone is a little dull, albeit its slightly artificial mid-range reproduction. On the plus side, the instrument separation is excellent.

Conclusion

In our tests we found the Marshall London phone the best for overall audio quality, followed by the Samsung Galaxy S6 in second place and the Apple iPhone 6s in third. The Marshall London phone also topped our speaker quality tests, while the Galaxy S6 came out on top for internal audio quality.

Speaker quality

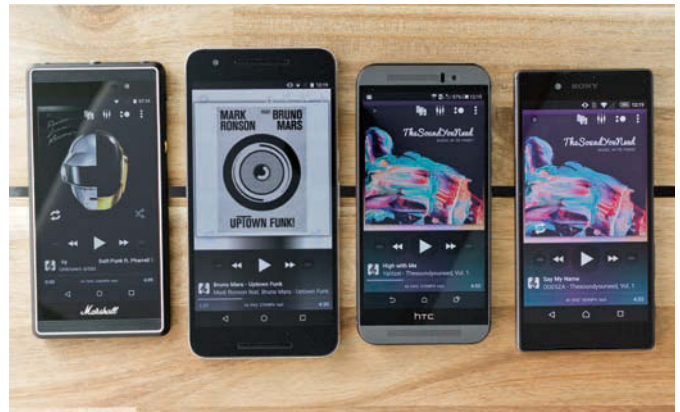
We were impressed by most of the phones we tested, with a good overall sound reproduction in most cases. We only felt the OnePlus 2 had trouble reproducing an accurate, realistic sound.

It came to no surprise that the four phones with dual front-facing speakers all sounded better than the single firing-designed speakers. This made the Google Nexus 6P, HTC One M9, Marshall London and Sony Xperia Z5 stand out from pack. Despite them all having different sound signatures and qualities, it was a much better listening experience with the speakers facing us, rather than the speakers being concealed at the back or at the bottom of the phone.

Overall, we felt the Marshall London had the best blend of low, mid and high frequencies to provide an impressive and yet powerful sound. If external speaker sound is important to you, then it should be the phone that's top of your to-buy list.

Internal audio quality

The phone with the best internal audio quality is the Galaxy S6, due to its Wolfson Microelectronics WM1840 audio codec. The phone produced fantastic quality audio, with a very minimal amount of distortion and a good overall frequency reproduction through the



lows, mids and highs. It should be noted that the Samsung has a slightly warmer tone over phones such as the iPhone 6s. However, due to its fantastic bass extension and its tonality, the Galaxy S6 is able to produce some of the best sound from a phone.

Most people will use their phones without an external headphone amplifier of any sort, which also bodes well with the Galaxy S6, as it was able to easily drive our earphones and most of our headphones to a reasonable level. In comparison, some phones, such as the Google Nexus 6P struggled to drive low impedance earphones, let alone slightly harder-to-drive headphones that had higher impedance. This is why the Samsung Galaxy S6 is our recommendation for its fantastic internal audio capabilities.

Jargon buster

DAC: Digital-to-Analogue Conversion is where digital audio files are converted to analogue sound, which can be heard by headphones and earphones. Some phone manufacturers have opted to have a dedicated DAC, as it produces a more accurate sound.

Decay: This is often defined by the choice of materials used in head- or earphones. Its definition isn't set in stone, but is used to describe the way sound frequencies bounce off materials and resonate.

Highs: The sparkle in your music (cymbals and high hats, for example) comes from the highs. The better they are, the more sparkle you'll have. Sometimes you might be treated with too much high-end frequencies, which leads to sibilance. A good extension of the highs can lead to a more open soundstage.

Imaging: This term is used to describe the way the music is portrayed - poor imaging means the sound that is being reproduced isn't accurate. Imaging is often linked with the soundstage and the decay, as it goes hand-in-hand with these two.

Instrument Separation: The term is pretty self-explanatory, but when talked about in audio equipment refers to the way instruments sound in different positions. Often when music is recorded, the sound engineer/producer will make a certain sound intentionally come from a specific direction. When coupled with the soundstage, the instrument separation aids in the immersion of the music.

Lows: Lows are known as the bass - it's a combination of both the sub- and mid-bass frequencies.

Mids: The mid-range frequency, the 'in-between' of the low and high frequencies. This covers everything from a range of instruments and vocals. It can sometimes be split up again into the lower mid-range that transits off the bass and contains most male vocals, and the higher mid-range that projects most female vocals. If the mid-range is boosted and reproduced correctly, it can add a sense of clarity to songs. This is where a lot of portable amplifiers tend to focus on and where the term 'cleaner sound' comes from.

Mid-bass: This is the bass slam - the more noticeable bass frequency found in almost every audio equipment. The best way to describe it would be the bass that comes from a drummer on-stage.

Output Impedance: Output impedance in audio is the resistance and output that can be heard from an amplifier. In the case of a phone, this applies to the internal amplifier that's used. The output impedance can create an absence of bass or a skewing of the frequency response of a source, in this case a phone.

Rolled- or cut-off: These terms are used to describe the lows and highs. The low-end when not fully extended can seem cut-off, where a manufacturer has in essence not extended the lows. The term 'rolled-off' works in the same principle, but is often used to describe the highs - where they sound soothed out, rather than extended.

Soundstage: The soundstage refers to the positioning and placement of the sound relative to your ears. A visual comparison would be contrasting an opera hall and a small room, where the latter would provide a narrower, more closed soundstage, while the opera hall

would reproduce the exact opposite. It should also be noted that depth and width are coupled with the soundstage, where the depth refers to the amount of vertical space that is being produced and the width is the amount of horizontal sound heard.

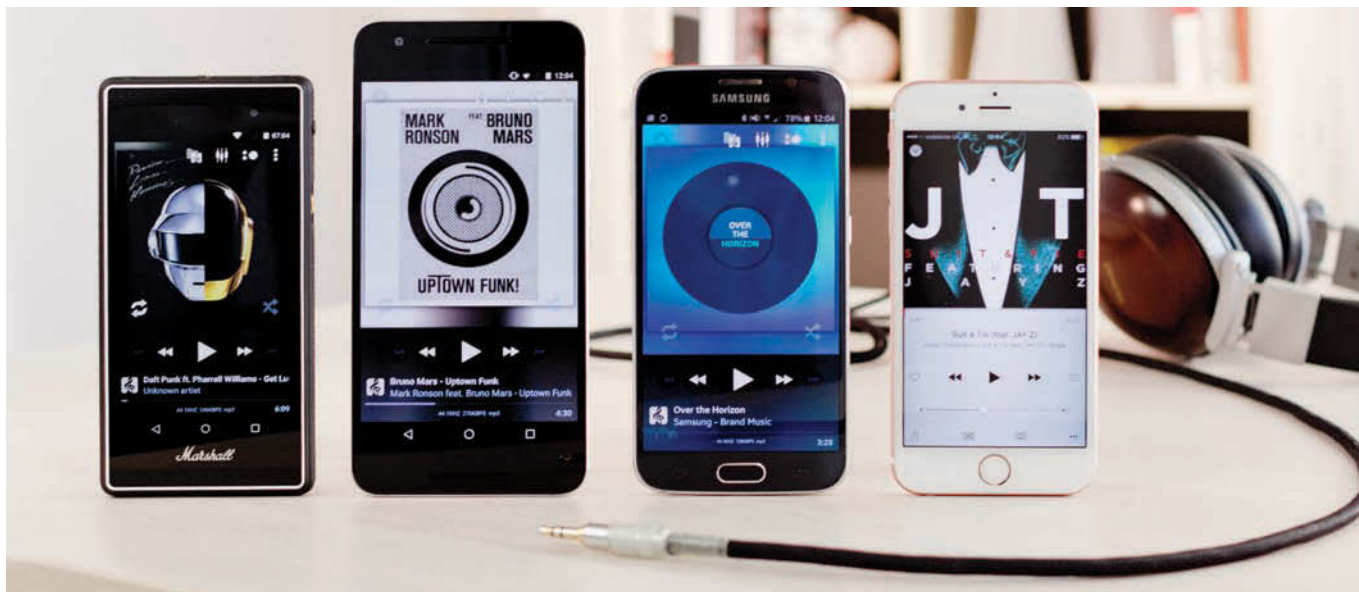
Sibilance: This refers to the hissing sounds found in certain earphones that have a spike at a certain high frequency. Sibilance isn't exactly a bad thing, but when there's too much, it can become irritating and problematic for sensitive ears.

Sound Signature: This is often described to be the unique stamp from a manufacturer. People will often refer to sound signature along with a name of a manufacturer; for example, The Wolfson

sound signature). It can also be used to describe how the sound is being portrayed - as a warm/cold sound.

Sub-bass: A good sub-bass response gives you a longer and more accurate bass reproduction. As a note: Sub-bass is heard in higher-end audio equipment, as it's harder to distinguish, a lot of manufacturers that want to cut costs on their speakers and amplifiers, tend to cut off the bass extension.

Warm sound: Often used to describe a V-shaped sound signature, which is created by an emphasis on the low- and high end tones, while the mid-range frequencies are pushed back. This created a sense of warmth to the sound that makes it more fun to listen to.



How we test

The testing was mainly based on the Harschacoustic SH-2 custom IEMs and the modded Denon AH-D2000 headphones, as these us to easily draw out the differences between the various smartphones.

We used the Poweramp app on all the Android phones, the Groove Music app on Windows handsets and the iTunes Music app on the iPhone 6s. Each phone also had its equaliser and audio changing features disabled. This was in order to test the hardware, rather than the audio-software of each phone. At the time of writing, all phones were updated to their latest available software (listed below).

Custom earphones

- Harschacoustic SH-2 Custom IEM Universal earphones
- Phonak Audéo PFE 232
- DUNU Titan 1
- SoundMagic E10
- Monoprice 8320

Headphones

- Modified Denon AH-D2000 (D5000 dampened cups, D7000 cable, Lawton Audio pads)
- KEF M500
- Bowers & Wilkins P5 Series 2
- Audio-Technica ATH-MSR7

Music

Here is a small sample of the songs used to test the phones. They varied between a mix of MP3s and FLAC sound files at various bitrates and sample rates:

- ODESZA, *Say My Name*
- Yahtzel, *High with Me*
- I-Cube, *Adore*
- Madonna (Stéphane Pompougnac Remix), *What It Feels Like for a Girl*
- Variety Lab, *London in the Rain*
- Armin van Buuren, *Breathe In Deep (The Blizzard Remix)*
- W&W, *Manhattan (Craving Remix)*
- John Legend, *Who Do We Think We Are*
- Daft Punk ft. Pharrell Williams, *Get Lucky*
- Ne-Yo, *Champagne Life*
- Bruno Mars, *Uptown Funk*
- Dr. Dre, *The Next Episode (San Holo Remix)*

Portable amplifier

- DigiZoid ZO2 v2.3 and used alongside a 3.5mm to 3.5mm Custom Art silver braided interconnect cable

Software versions

- Google Nexus 6P, Android 6.0.1
- HTC One M9, Android 5.1
- iPhone 6s, iOS 9.2
- LG G3: Android 5.0.2
- Marshall London, Android 5.0.2
- Microsoft Lumia 950, Windows 10 Mobile
- OnePlus 2, Android 5.1.1
- Samsung Galaxy S6, Android 5.1.1
- Sony Xperia Z5, Android 5.1.1

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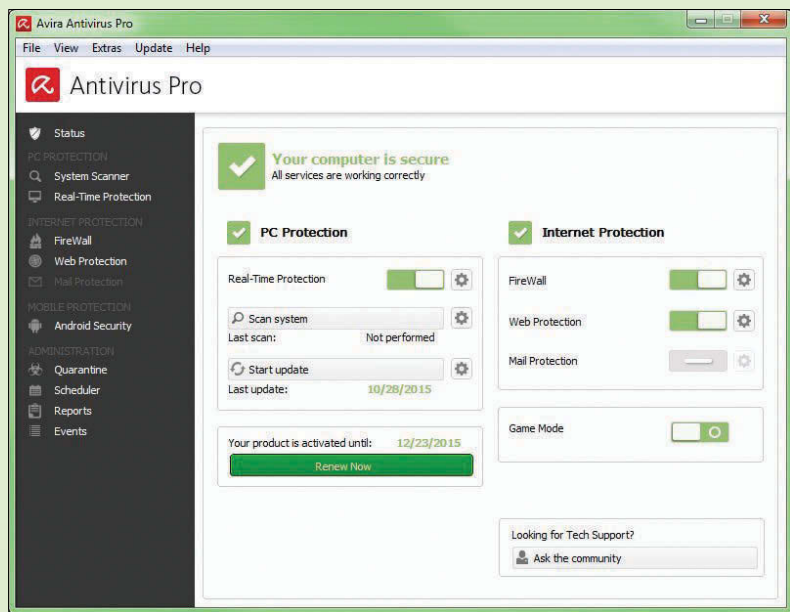
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9 WAYS TO KEEP YOUR WINDOWS COMPUTER SAFE

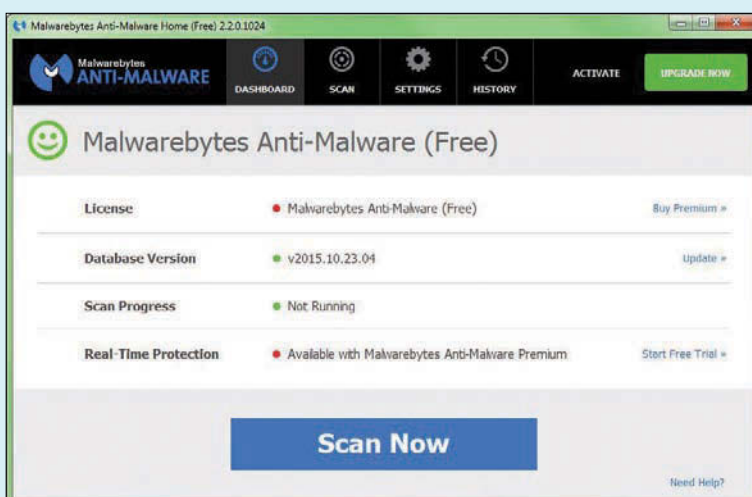
Lincoln Spector gives an overview of what you need to do to stay safe online

For today's criminals, the internet is where the action is. Compared to traditional thieves, cybercriminals make more money with less risk. And that means that we have to be extra cautious. Protecting yourself in cyberspace is more complex than locking your door or keeping a hand on your bag. However, that doesn't mean only the technically minded can keep their computer safe: follow the nine tips here and you face a much reduced risk of becoming a victim. They don't apply only to Windows PCs: you can use the same principles to keep safe on your tablet and smartphone as well.

1 ANTIVIRUS: Whenever Windows is up, it should be running an up-to-date antivirus program. These work in the background, blocking not only viruses, but all sorts of malware. Check our website for the most up-to-date reviews at tinyurl.com/hz54e6L.

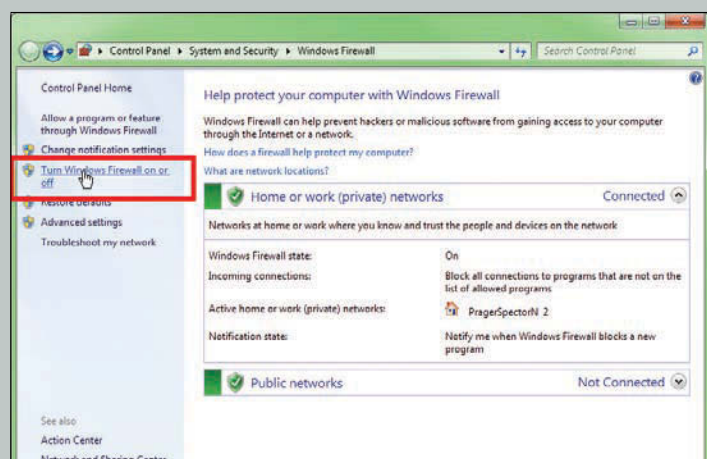


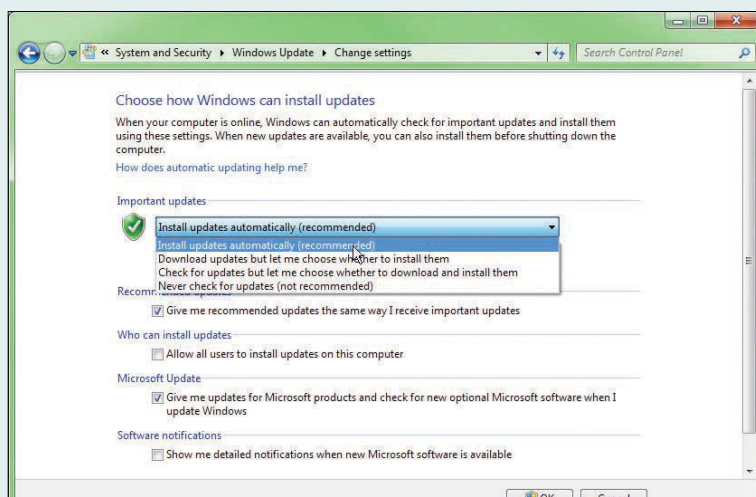
2 ANOTHER-OPINION MALWARE SCANNER: Even the best antivirus program can miss an occasional attack. So, once a week, scan your PC with another program that scans only when you tell it to. We recommend the free version of Malwarebytes Anti-malware (malwarebytes.org).



3 FIREWALL: This runs in the background at all times, and controls the traffic between your PC and the rest of the network (and internet). Windows comes with a good firewall, but you should make sure it's switched on.

Search for Firewall and select Windows Firewall in Control Panel. In the left pane, click Turn Windows Firewall on or off. Finally, select the relevant option.

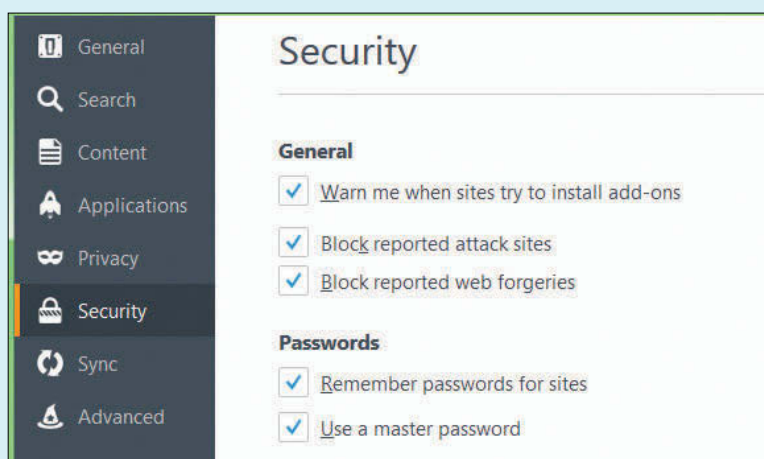
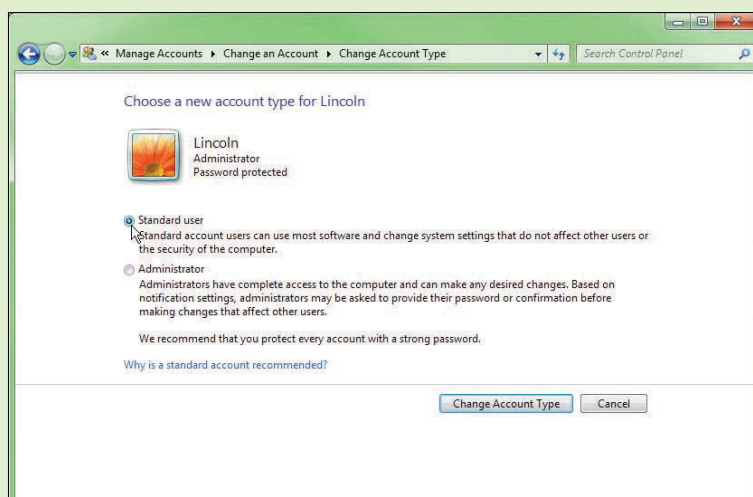




4 UPDATES: Make sure Windows updates itself automatically. In Windows 7 or 8, search for and launch Windows Update. Click Change settings in the left pane. If Install updates automatically (recommended) isn't selected, select it.

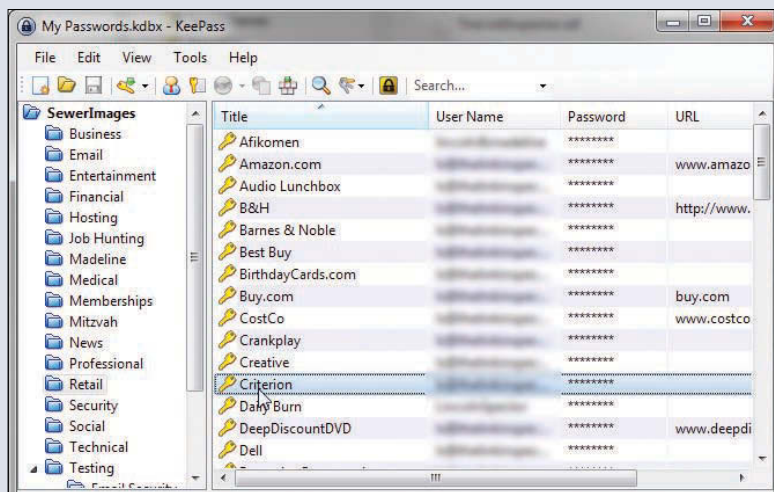
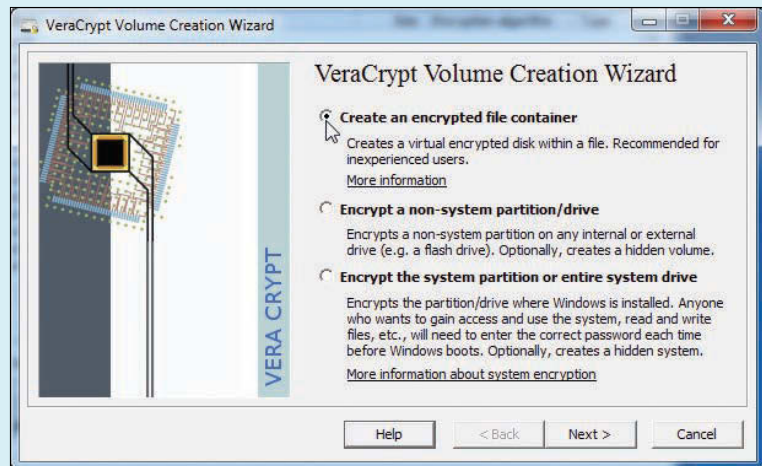
In Windows 10, search for windows updates and select Windows Updates Settings. Scroll down to the bottom of the window and click Advanced options. Make sure Automatic (recommended) is selected.

5 TWO ACCOUNTS: You need an administrator account for managing Windows, and a separate standard for work and play. If you're currently doing everything inside one administrator account, go to Control Panel's User Accounts tool. Create a new Administrator account, then change your previous account's type to Standard. Continue to do your work in your old, now-standard account.




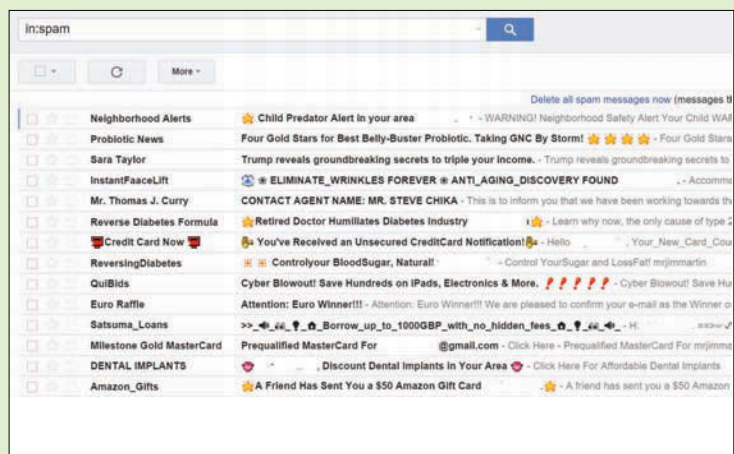
6 WEB BROWSER: Just like Windows, your browser needs to be up to date and secure. Go to your browser's settings to make sure it updates regularly and that it's set to block suspicious sites.

7 ENCRYPTION: If your PC is stolen, don't let the thieves get your secrets, as well. Put your most sensitive files in an encrypted container such as VeraCrypt (tinyurl.com/nxpxg86).



8 PASSWORDS: You need a separate password for every website you log into, and each password must be long, strong, and complex. How do you remember them all? With a password manager, such as KeePass Password Safe (keepass.info).

9 EMAIL: Your email client probably has a good spam filter, but it's not perfect. Some bad messages may get through. Learn to identify them and don't fall for scams - see tinyurl.com/htgnnmj. 



OVERCLOCKING INTEL'S SKYLAKE CHIPS

Thanks to a workaround, it's now possible to overclock cheap Intel Skylake chips, reveals [Gordon Mah Ung](#)

Budget PC builders are in for a treat: it's been officially confirmed you can now heavily overclock Intel's cheap Skylake chips with a BIOS update.

Tech site TechSpot confirmed it through a series of tests (tinyurl.com/z2p8sso). The team overclocked a Skylake Core i3-6100 from its default clock speed of 3.7- to 4.7GHz, after motherboard maker ASRock provided them with a beta BIOS that required switching off the integrated graphics.

Intel's past few generations of chips have limited overclocking to pricier K-series CPUs. With an apparent workaround discovered, higher clock speeds and in essence 'free performance' may become far more attainable for those who can't afford a K chip.

An overview of overclocking

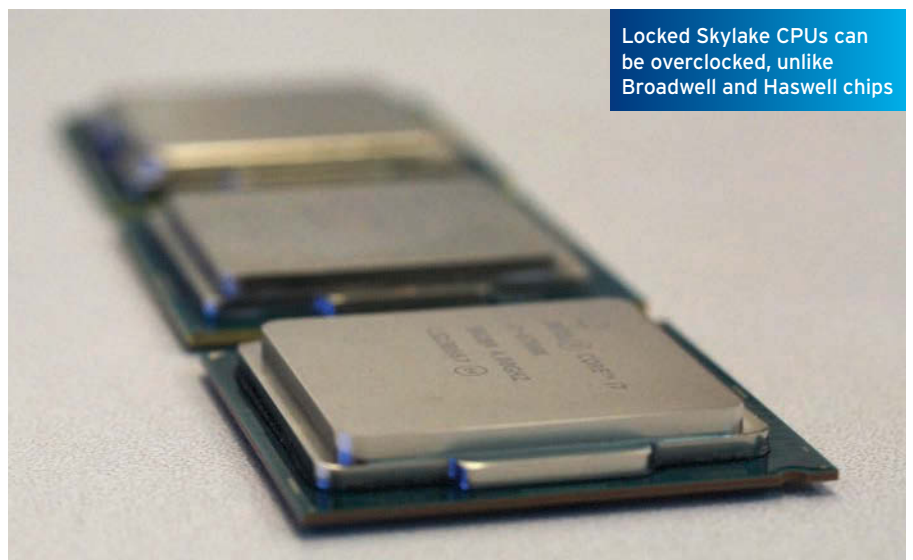
Overclocking is the term for running a CPU's clock speed above its rating from the factory. This may sound dangerous - and it can be if done improperly - but many CPUs are artificially limited to lower speeds by Intel at the factory to help meet prices.

In this case, Intel's cheapest K Skylake chip is the £199 Core i5-6600K with a factory

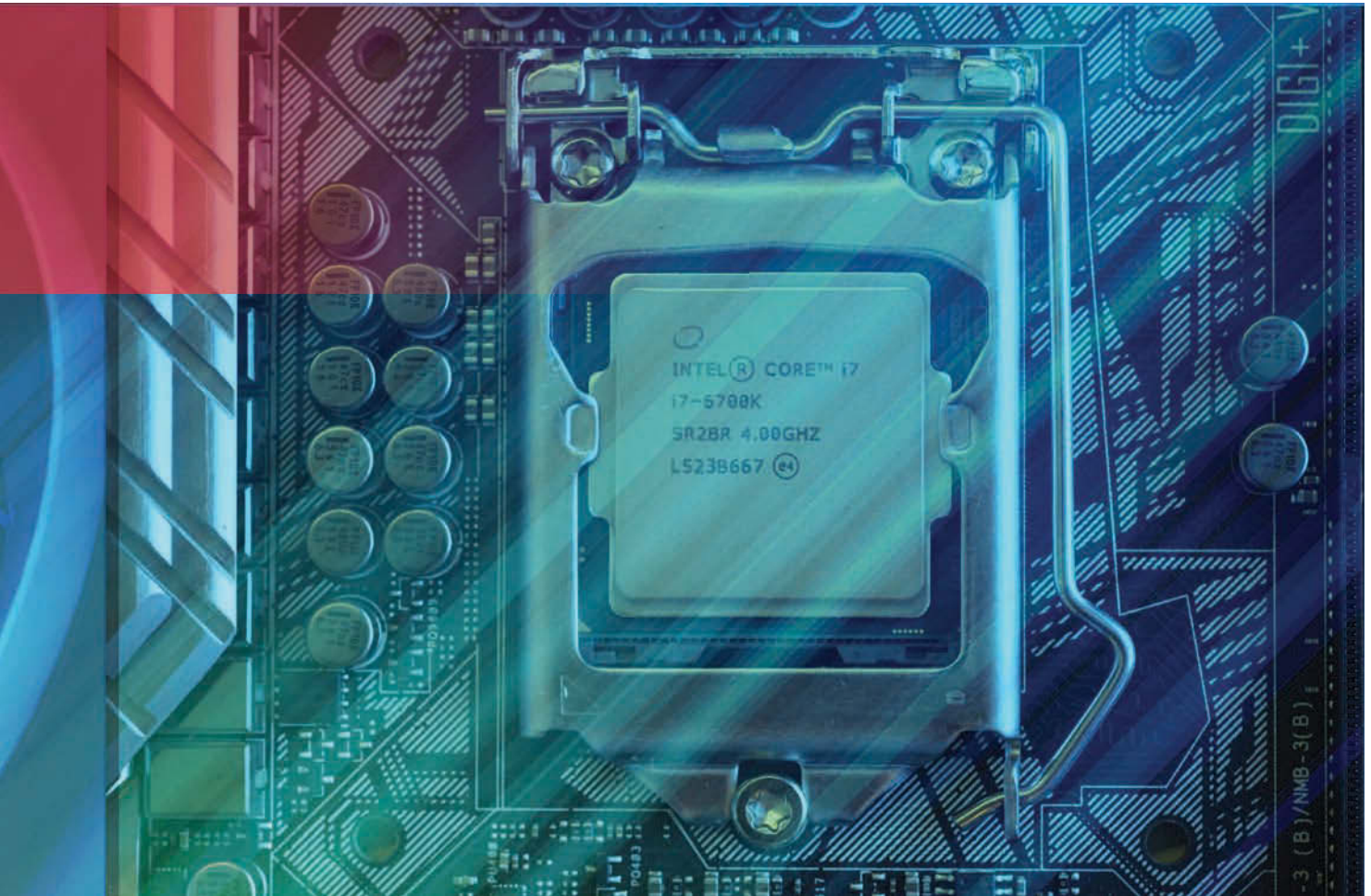
clock speed of 3.5GHz. The same chip has an equivalent Core i5-6500 for £167 at 3.2GHz. If you could take that cheaper CPU and overclock it to the same speed, why buy the pricier part?

An architecture change within the sixth-generation chip that separates the

chip's 'base clock' (BCLK) from other components appears to be the culprit behind the newly enabled overclocking. The base clock is one of the internal clocks that regulates the overall megahertz of the chip. With Haswell or Ivy Bridge, for example, the base clock was hooked up to other sections



Locked Skylake CPUs can be overclocked, unlike Broadwell and Haswell chips



of the CPU, causing instability when the base clock was increased even in small amounts. That's no longer the case, and after speculation over whether base clock overclocking could work, we know it could.

Maybe only dual-cores?

It's worth noting that TechSpot's overclocking confirmation was achieved only with the dual-core Core i3 chip. Tech site AnandTech's attempt at performing a base clock overclock of a quad-core Core i5-6500 hit a wall well before TechSpot's dual-core would (tinyurl.com/ns6jgx9). But it isn't known whether that's because of the motherboard AnandTech used or because board vendors are still tweaking their BIOSes to enable the overclocking.

Skylake is overclocking-friendly

Asked about the apparent overclocking loophole, Intel officials said they didn't condone it saying only: "Intel does not recommend overclocking processors that have not been designed to do so. Intel does not warranty the operation of the processor beyond its specifications."

As desktop PC sales continue to decline, Intel has increasingly relied on sales to enthusiasts and gamers, who have no problem paying a premium for overclocking-friendly chips

In other words, "We only bless K chips for overclocking." What's not clear is how Intel will react to the overclocking loophole. When Skylake launched, the company pushed the chip as being friendlier to overclocking than previous K chips. Intel has condoned overclocking for a few generations of chips, but in recent years seems to be pushing it even more heavily.

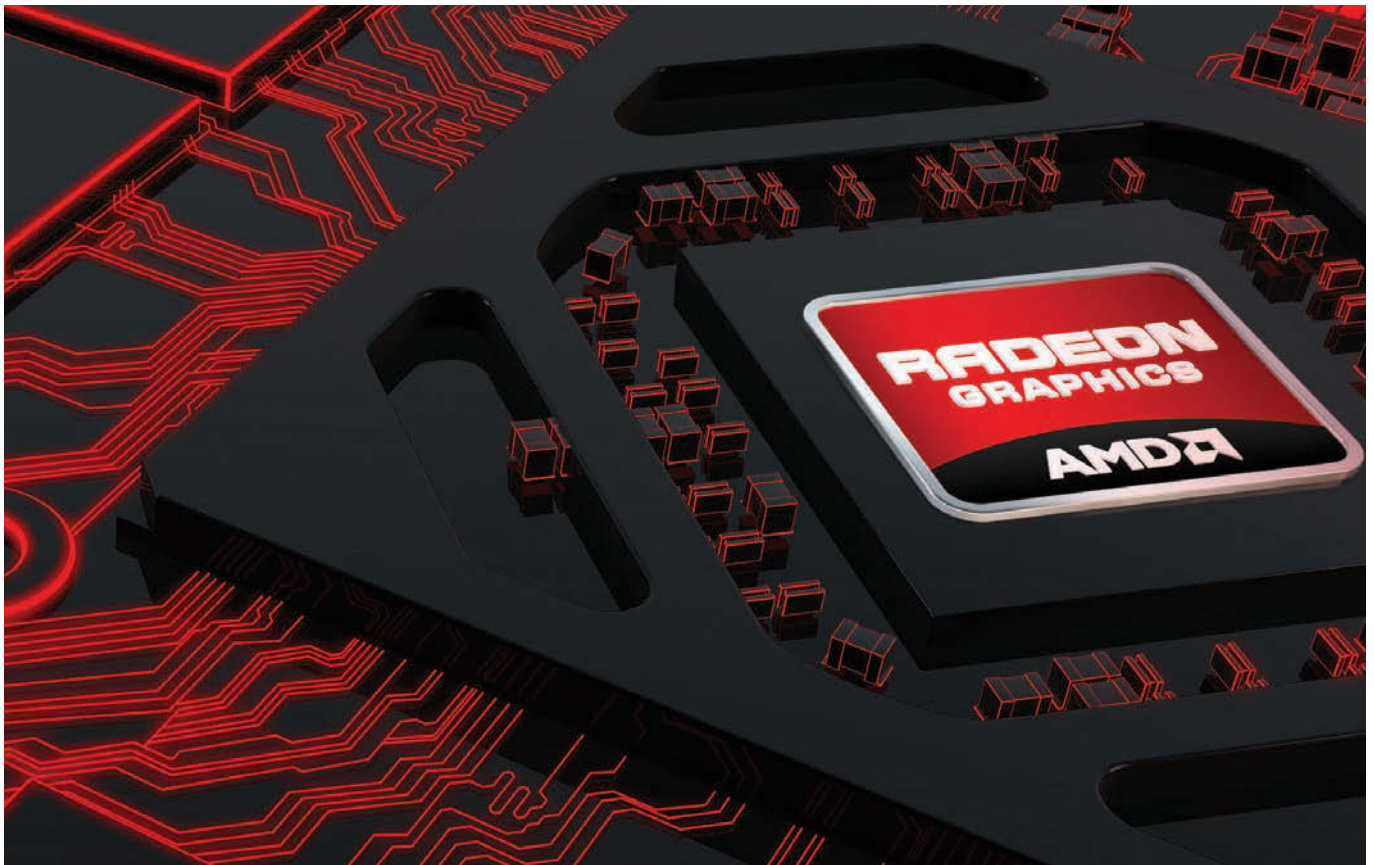
As mainstream desktop PC sales continue to decline, Intel has increasingly relied on sales to enthusiasts and gamers, who have no problem paying a premium for overclocking-friendly chips. If a groundswell of PC builders suddenly reached for the cheaper, overclock-ready chips to save a few bucks, that could impact sales of Intel's premium K chips.

This wouldn't be the first time Intel had to squash such a trend. Intel's chipset for its Haswell series included the Z-series for overclockers alongside the cheaper H- and B-series chipsets. When motherboard vendors discovered a way to enable overclocking on the lower-cost H- and B-series, Intel stopped them by updating the microcode on its CPUs, forcing buyers to move back to the higher-margin motherboards with the Z-series chip.

It's just as likely that Intel could look the other way. The company has truly been friendlier to overclocking. It has sponsored extreme overclocking contests using liquid nitrogen and liquid helium, and even threw a bone to budget builders, with its £52 Pentium G3258 'anniversary edition' in 2014 that was ready for overclocking. ☒

MEET RADEON SOFTWARE CRIMSON

AMD has packed its next-generation drivers with killer features, writes **Brad Chacos**



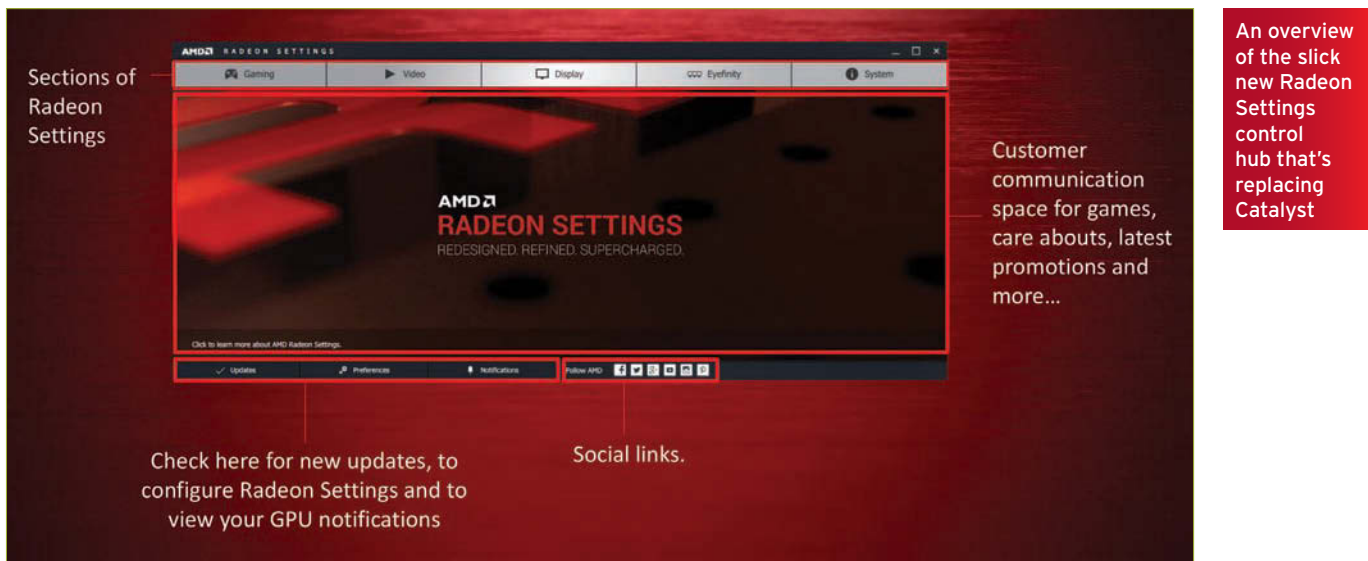
With high-bandwidth memory in the bag and cutting-edge processor technology finally appearing on the horizon for graphics cards – all GPUs have been stuck on 28nm since late 2011 – AMD's gearing up for a major fight against nVidia in 2016. But the nuts, bolts, and transistors are only part of the equation with modern-day graphics cards; the recently created Radeon Technologies Group is rolling out the rebuilt-from-the-ground-up software Radeon Software Crimson to accompany the new breed of AMD hardware.

AMD's first tease of Crimson was a run-through of the slick new Radeon Settings hub designed to replace Catalyst Control Center. At the time, AMD revealed some of the overt new features in Radeon Settings, such as per-game OverDrive overclocking settings and one-click Eyefinity multi-monitor configuration. More recently, AMD's has revealed the deeper-level offerings in Radeon Software Crimson, with handy features for new and old graphics cards alike, and pushing the drivers live, so you can try them out for yourself.

Let's take a look at what's on tap. And remember: These new tricks build atop the features already introduced in Catalyst Omega and the Catalyst 15.7.1 drivers released in the past year, so you'll still find options such as Virtual Super Resolution and Full HD to Ultra HD Video Scaling intact.

Gaming

Radeon Software Crimson offers a new 'Shader Cache' option that reduces stutter and can launch your games up to 33 percent faster than 2014's Catalyst Omega



drivers, according to AMD. The feature can be enabled on a per-game basis inside the game-specific options in Radeon Settings' new Games hub. AMD claims that Star Wars Battlefront load times on a Windows 10 system with a Core i7-5960X, a Radeon R9 380, and 16GB of DDR4-2666MHz memory improved by 5.7 seconds with the Shader Cache enabled, while Witcher 3 played smoother on another system with Shader Cache active.

AMD adds that displays initialise up to three times faster with Radeon Software Crimson than they did with Catalyst Control Center. The Radeon Settings software itself launches up to 10 times faster than Catalyst

Omega does, though that will vary depending on your system setup.

AMD's new software can also optimize the flip queue size - basically, how many frames are calculated in advance before being displayed - to reduce latency in games when every split second counts, most notably e-sports. Fewer precalculated frames means more responsive gameplay. NVidia rolled something similar out with the GTX 950, which is targeted toward players of Dota 2, League of Legends, and the like. It's nice to see AMD offer something similar.

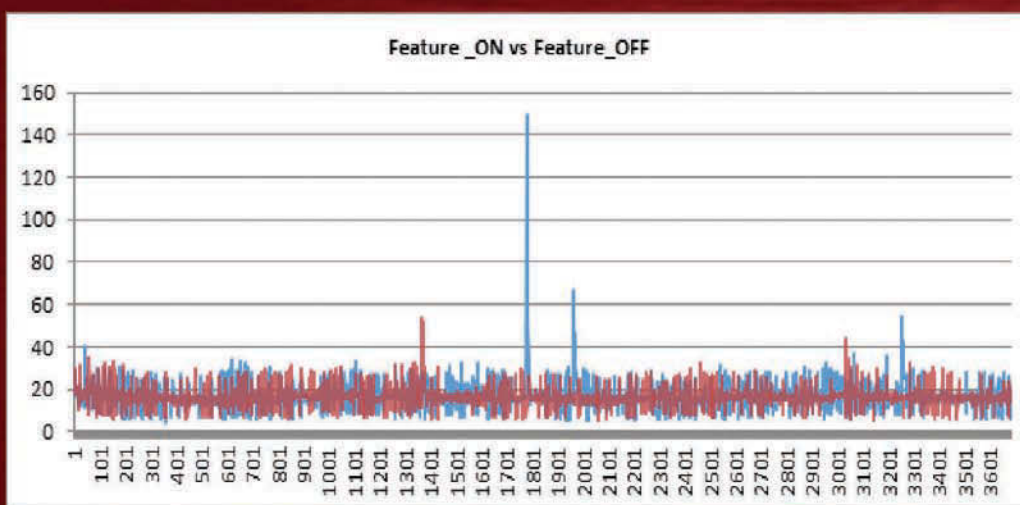
But what if you want to sacrifice speed for vastly increased power efficiency? AMD's Frame Rate Target Control lets you cap the

maximum frame rate output of your GPU, so that it doesn't waste power rendering frames you won't notice anyway: for example, when your graphics card can output 90fps in a game, but your monitor only supports 60fps. FRTC proved wildly successful in our testing, and now AMD is bulking up the feature. Whereas before FRTC only worked with DirectX 10 and 11 games and was capable of limiting frames to between 55- and 95fps, the new software embraces DX9 titles, and the frame rate limits are being expanded to between 30- and 200fps.

FreeSync, AMD's brand for game-smoothing variable refresh rate display technology, is spreading its wings, too.

Reduced stutter and latency

The Witcher® 3 on AMD Radeon™ R9 390X graphics



AMD Catalyst™ 15.7.1

Radeon Software
Crimson Edition

Feature OFF vs Feature ON						
Comparison Type	FPS			Std Dev / Avg Time		
The Witcher 3	61.43	0.15%	61.52	22.77%	-12.23%	10.54%

Core i7 4770K, 8GB DDR3-1600, AMD Radeon™ R9 390X, Windows®



A visual representation of optimised flip queue size

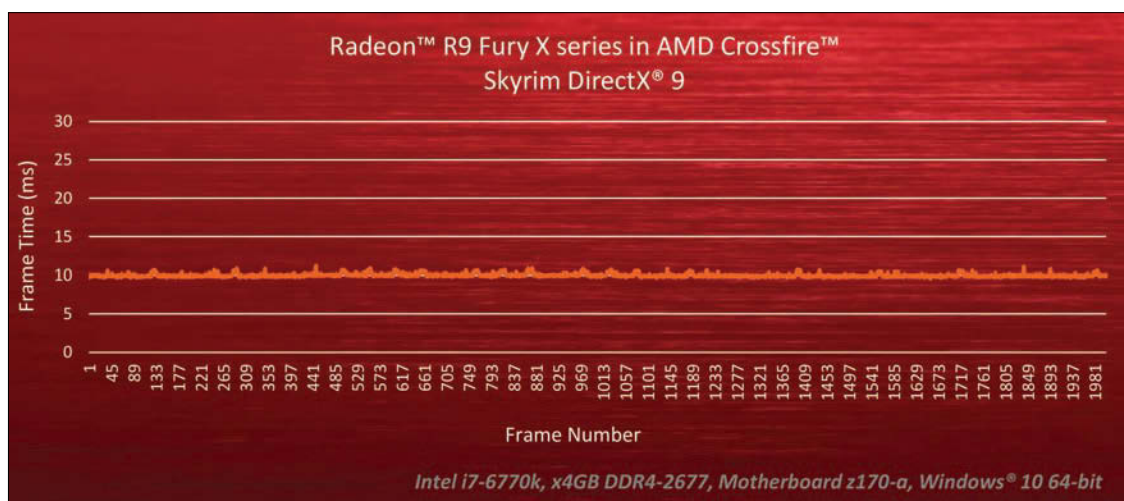
VRR gives you a super-smooth gameplay experience inside of predefined frame rate windows, such as 45- to 75fps. If your frame rates fall outside those windows, the VRR isn't active, and the results can be nasty below the minimum VRR refresh rate. NVidia's proprietary G-Sync solution has long handled sub-optimal frame rates in a superior fashion, by doubling or tripling individual frames in order to maintain the smooth look without nasty flickering effects, leaning on the G-Sync module in the display for help.

AMD is striking back with its new 'Low Frame Rate Compensation' technology, which uses an adaptive algorithm to keep your games as smooth and tear-free as possible under the minimum refresh window. This software-based solution probably won't work as smoothly as G-Sync's hardware-assisted fallback, but it's still sure to be a boon for Radeon gamers with FreeSync displays. (And really, it's best to tweak your games' graphics settings to stay inside your monitor's VRR window anyway.)

FreeSync support is also being extended to DX9 games, such as the aforementioned e-sports titles and Skyrim. Speaking of DX9, Radeon Software Crimson also extends AMD's Frame Pacing for multi-GPU CrossFire setups to DX9 games. Multi-GPU setups are complex beasts, with each graphics card rendering every other frame in full. A few years back, that resulted in nasty stuttering on many CrossFire setups. Frame Pacing fixed that, and it's great to see it bring DX9 titles into the fold.

What happens both inside and outside FreeSync's VRR window. Note the new behaviour with Low Frame Rate Compensation

FPS vs. REFRESH RATE	VSync	AMD FreeSync™ Without LFC	AMD FreeSync™ With LFC
FPS >= Max Refresh Rate	VSync ON	Smooth Motion, No Tearing	Same
FPS >= Max Refresh Rate	VSync OFF	Smooth Motion, Tearing, Uncapped Mouse Latency	Same
FPS Within Min/Max Refresh	VSync ON VSync OFF	Smooth Motion, No Tearing, Uncapped Mouse Latency	Same
FPS < Min Refresh	VSync ON	No Tearing, Motion Judder	*NEW* No Tearing, Smooth Motion
FPS < Min Refresh	VSync OFF	Tearing, Low Motion Judder	*NEW* Reduced Tearing, Lower Motion Judder



An example of the smooth frame pacing in Skyrim with CrossFire's R9 Fury X graphics cards now that Frame Pacing is supported in DX9 games

Wrapping up the gaming front, Radeon Software Crimson also includes performance improvements for the latest games and various optimisations for the new DirectX 12 technology found in Windows 10. The first DX12 titles are just around the corner. Linux driver performance has also been improved for many games.

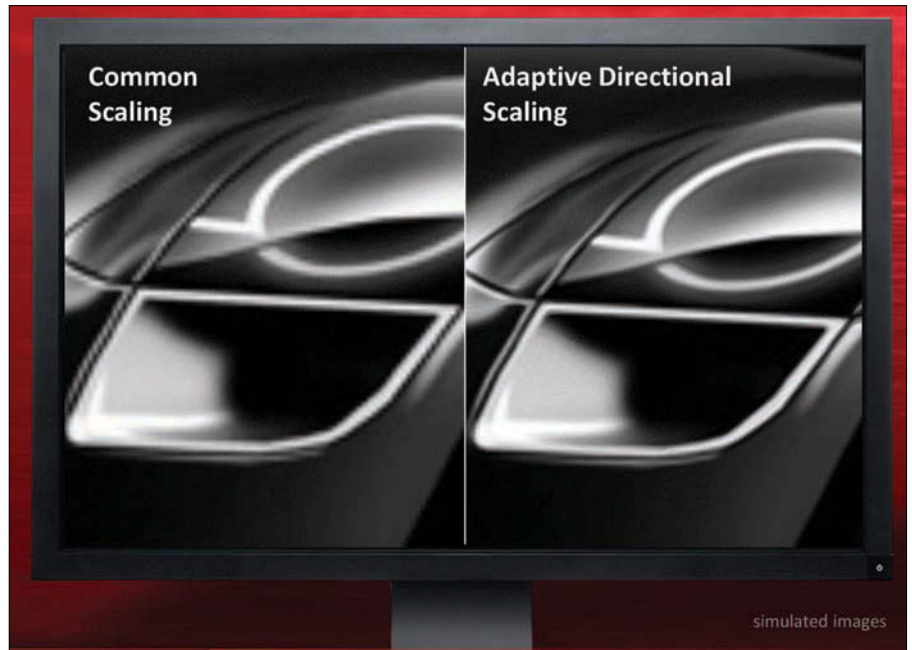
That's great to hear - though a little strange, given that AMD has announced Crimson support only for Windows 7, 8.1, and 10. Linux performance is a glaring sore spot for AMD, though the new unified Linux driver architecture it's working on will hopefully alleviate the problem even further.

Beyond games

Radeon Software Crimson's new features and performance tweaks don't focus on games alone, though.

AMD's latest sixth-generation APUs gain some new video tricks. Not only will video look smoother, with less motion blur, AMD says new Advanced Detail Enhancement technology in the drivers will sharpen images further as well, building on the 1080p Detail Enhancement introduced in 2014's Catalyst Omega drivers.

The AMD A8-8600P and higher APUs, and Radeon R9 380 and higher GPUs pick up an updated dynamic contrast ratio



the nasty 'staircase effect' common when upscaling images to higher resolutions.

Beyond new features, Radeon Software Crimson lets you deeply tinker with your displays: setting custom resolutions, timings, refresh rates, and pixel clocks for each screen in your setup.

AMD is also investing in heavy quality assurance testing for Radeon Software

An example of scaling an image to 4K resolution without directional scaling (left) and with directional scaling enabled (right)

with 100 percent more automated testing and 25 percent more manual testing across 15 percent more system configurations.

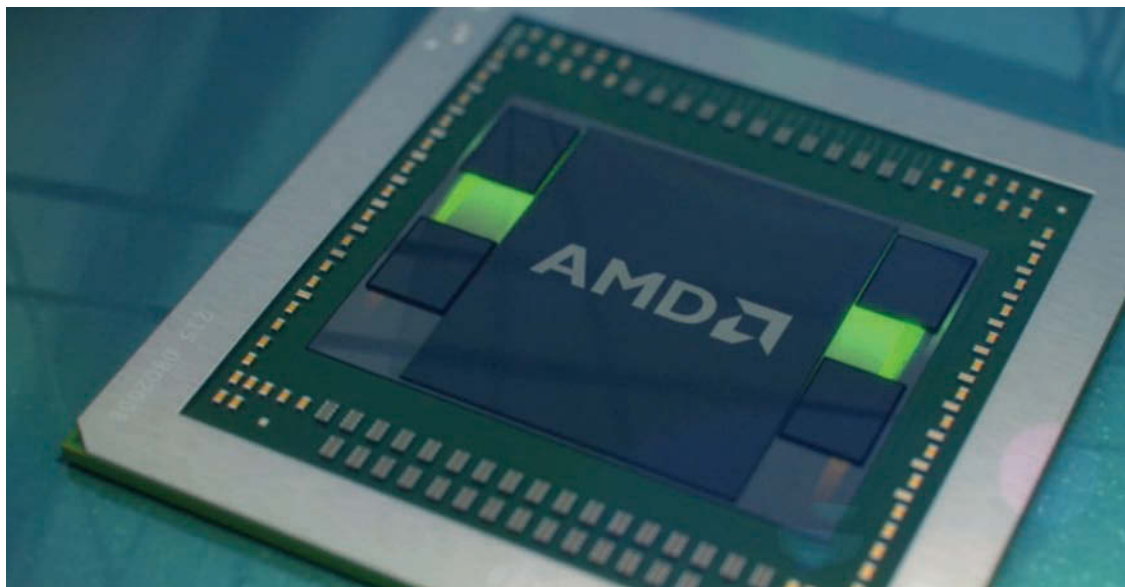
All in all, AMD's doing everything it can to dispel the perception that its drivers are lacking in comparison to nVidia's GeForce drivers. New Radeon Technologies Group head Raja Koduri has been beating the drum about the importance of software as part of the overall Radeon experience.

"Software is the first thing people see on their screen, the first part of their experience," explains AMD's Sasa Marinkovic. With Crimson, he adds that Radeon's "software is as equally represented as the hardware." ❌

AMD is striking back with its new 'Low Frame Rate Compensation' technology, which uses an adaptive algorithm to keep your games as smooth and tear-free as possible

algorithm, while the Fiji GPU-based Radeon Fury, Fury X, and Nano graphics cards have a new directional scaling feature that more intelligently scales 1080p and 2K imagery to fit 4K screens. The goal: to eliminate

Crimson. The company was already proud of the deep level of testing that went into 2014's Catalyst Omega driver. AMD says it conducted far more testing than that to help ensure Radeon Software Crimson's stability,



AMD's HBM-bolstered Fiji GPU

SECURE YOUR NEW PHONE, TABLET, LAPTOP OR PC FOR FREE

Marie Brewis reveals how to install AVG Free antivirus



If you've recently bought a new phone, tablet, PC or laptop, and are thinking of logging into Facebook or Twitter to tell the world - don't. Doing so without first installing an antivirus application is asking for trouble, and the chances are you'll have to spend a few hours clearing out viruses and other malware.

Here we explain how you can install one of the best-known free antivirus software programmes, AVG Free, on your Android phone, Android tablet, Windows PC or Windows laptop. We also discuss what steps you can take to protect a new iPad or iPhone.

Install AVG Free antivirus on a Windows PC or laptop

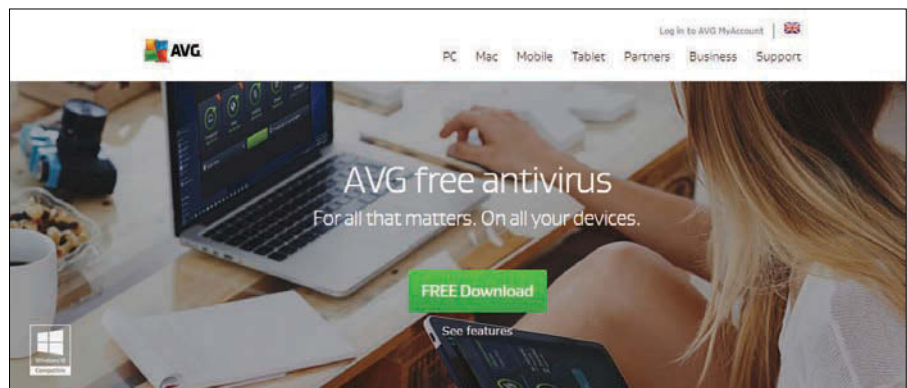
To download the free version of AVG Free, head to AVG's website (avg.com/gb-en) and click the big green Free Download button. On the next screen again click the green Free Download button at the top of the page.

The AVG_Protection_Free.exe file will automatically download to your PC. Launch the installer by clicking the notification at the bottom of your browser window or find the file in your Downloads folder. Note that you will need to be an administrator to install AVG Free. If you are not using an admin account, ask the administrator to enter their password. AVG will then begin to install.

On the first screen click Continue, then select Basic Protection and click Install now. When User Account Control pops up click Yes. AVG will install itself and download new updates, then run in the background on your PC. To run a scan at any time tap on the Protection icon on the AVG home page and select Scan now. You can otherwise leave it running in the background and forget about it.

Install AVG Free antivirus on an Android phone or tablet

Generally speaking, you can get away without installing antivirus on an Android phone or tablet, but there are malicious apps to be found outside the Google Play store, and installing them is as simple as unticking a box in the Settings that allows you to



download apps from unknown sources. Plus, Android is now the most popular mobile operating system in the world and, as we saw with Windows laptops and PCs, that means it will become increasingly attractive to wrongdoers. Since AVG antivirus is available for free, you might as well play it safe and install it.

Launch the Google Play store on your phone or tablet. You probably have an icon for this on your home screen; if not, open the apps menu and look for what looks

next screen choose what should be the top option: Antivirus Security - FREE.

On the next screen you'll see more details about the app, including its user rating and some screenshots. Tap the green Install button, then press Accept to allow AVG to access certain features on your device. Once it has installed the green Install button will change to Open - tap this.

Before you can begin using AVG Free for Android you need to accept its terms and conditions, so hit Get Started on the first

Generally speaking, you can get away without installing antivirus on an Android phone or tablet, but there are malicious apps to be found outside the Google Play store, and installing them is as simple as unticking a box in the Settings that allows you to download apps from unknown sources

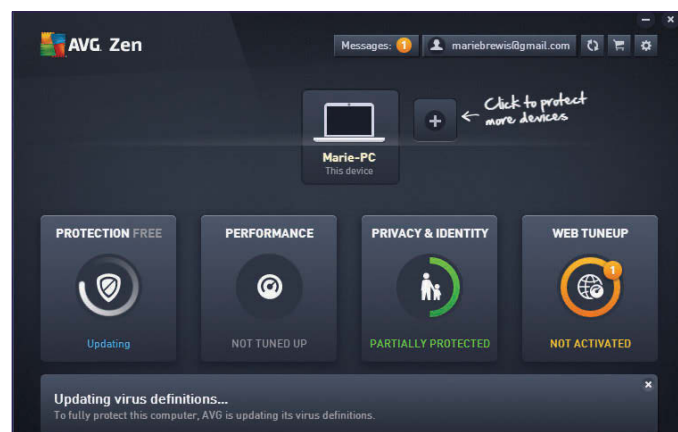
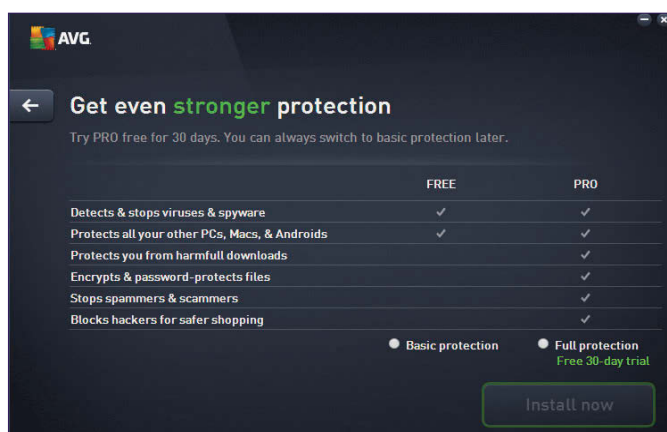
like a white shopping bag with a triangular icon on top. If this is the first time you've opened Google Play, you will be prompted to accept the terms and conditions. You will also need to have already set up a Google account on your device (if you bypassed this when you first turned on the device, add a Google account in the Settings menu).

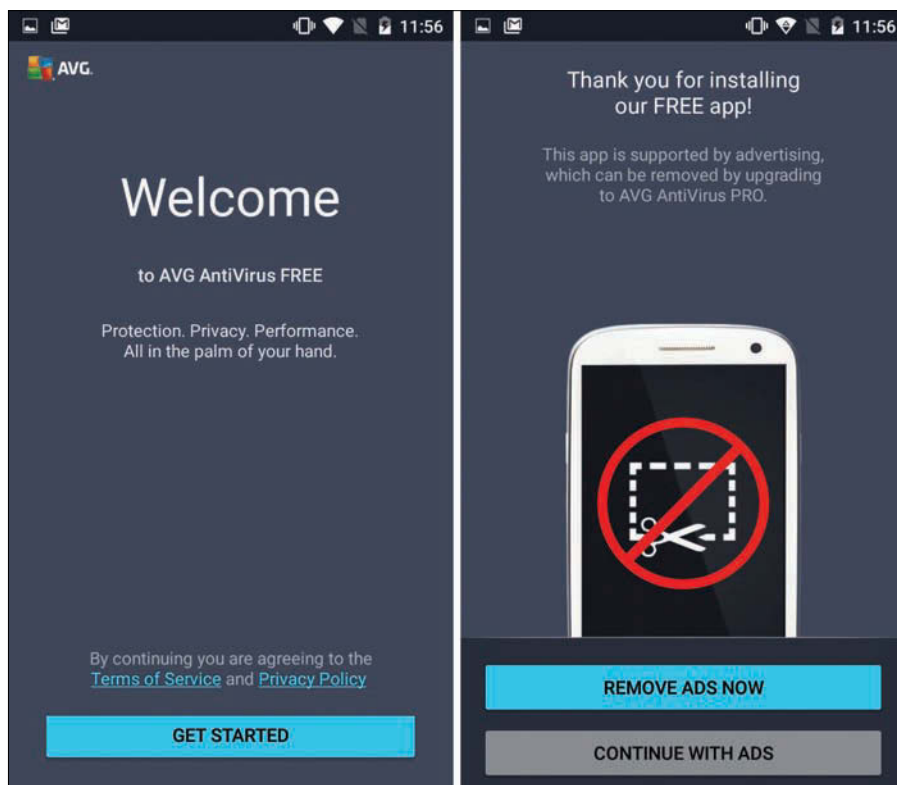
With Google Play open, tap the magnifying glass search icon in the top right corner and begin typing 'AVG Free'. Tap on the top result - AVG Free antivirus for Android - and on the

screen. You'll then be prompted to upgrade to the paid for version of AVG, which removes the ads. Don't do this unless you want to: the antivirus part of AVG is free. Just tap Continue With Ads to continue.

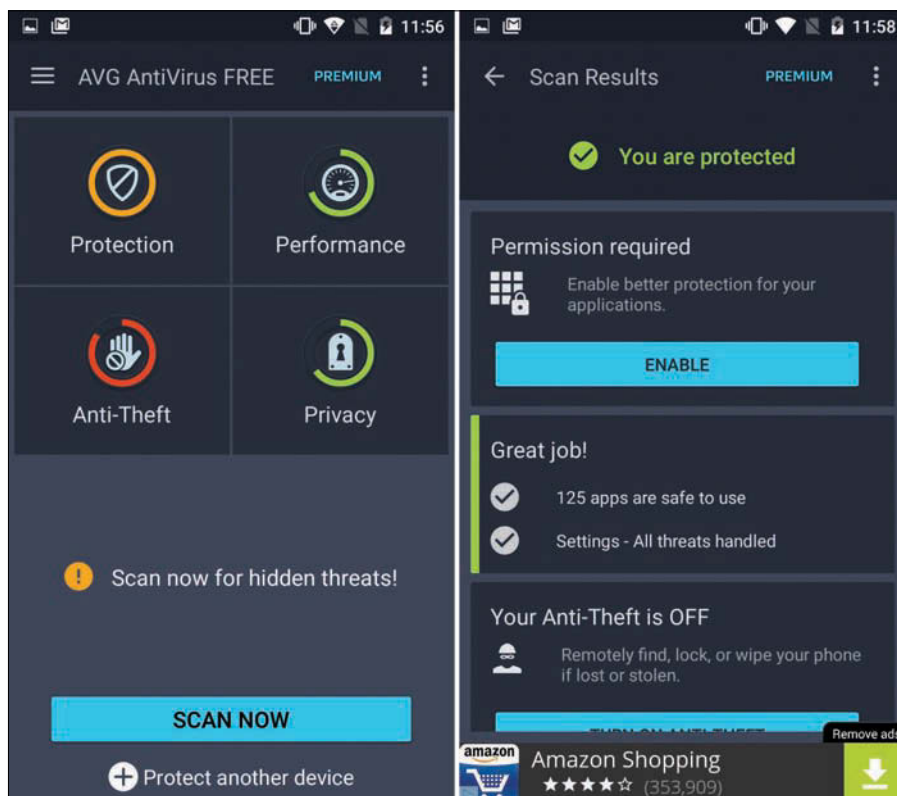
If this is a new phone or tablet, that's all you really need to do. By default AVG will scan your device once a week, although you can change this within the Settings, Protection settings menu.

If this is an older phone or tablet that you're only just getting around to





The Oleg Pliss and nude celebrities scandals were a result of hackers targeting Find My iPhone and iCloud accounts, then logging in as their victims. You should always use a strong password for online accounts, and avoid using the same login for multiple sites



installing an antivirus on, hit Scan Now. On the bottom left screenshot you'll see AVG found no threats, but in the past we have seen it flag up apps we know are safe. You don't need to blindly accept these warnings; just use your common sense. If it keeps flagging up an app or setting you want to keep, just tick the Ignore box to remove it from subsequent scans.

To keep AVG running at the best of its ability, make sure you keep it up to date. Launch Google Play and click the three horizontal lines icon in the top left corner, then choose Settings. Under auto-update apps choose to either Auto-update apps at any time or to update apps over Wi-Fi only (if you have a limited mobile data plan choose the latter). From time to time you may still find an app update requests your permission, and this will be because it wants you to accept its updated access requests.

Antivirus on an iPad or iPhone

In general iPads and iPhones are considered secure, since Apple keeps a constant check on any apps allowed in its store, and claims to have built iOS with security at its core. There have, however, been vulnerabilities. Even if you haven't heard of previous iOS malware that has hit the headlines, for example WireLurker, Masque Attack and Oleg Pliss, we doubt news of the nude photos of Jennifer Lawrence and other celebs leaked as the result of an iCloud hack passed you by.

These flaws have all been blocked by Apple - as have those that have occurred since - but in order to protect yourself from future attacks you need to ensure you install only safe apps and that all your logins are ultra-secure.

The Oleg Pliss and nude celebrities scandals were a result of hackers targeting Find My iPhone and iCloud accounts, then logging in as their victims. You should always use a strong password for online accounts, and avoid using the same login for multiple sites.

WireLurker targeted iPhones and iPads when they were plugged into insecure Macs or PCs. Only jailbroken devices were maliciously affected.

On that note, jailbreak your iPad or iPhone only if you really know what you're doing. A good rule of thumb is to never install untrusted apps found outside the App Store, since Apple has no control of what goes on outside its walls.

Finally, always keep your iPad and iPhone up to date. iOS updates are free to download and install, so there's really no excuse. If you're having trouble updating because you're running out of storage, just plug your iPad or iPhone into a (secure) PC or Mac and launch iTunes. ☒



USB-C charging:

Universal or bust? We plug in every device we have to chase the dream

Four devices and five chargers tell us just how close we are. By **Gordon Mah Ung**

USB-C is a fantastic piece of technology. For starters, it lets you plug a cable into your device without thinking about the orientation. But one overlooked advantage – for laptops, at least – could be the promise of universal charging. Rather than always having to carry your laptop's power brick with you, you could, in theory, just borrow a friend's power supply, just like you do with phones today.

Today, of course, we're a world away from that reality. From Microsoft's Surface Pro 4 to Dell's XPS 13, the majority of laptops still use proprietary chargers. Still, a growing number of USB-C-powered devices are appearing on the market, and we gathered a few of them to test USB-C's potential for universality.

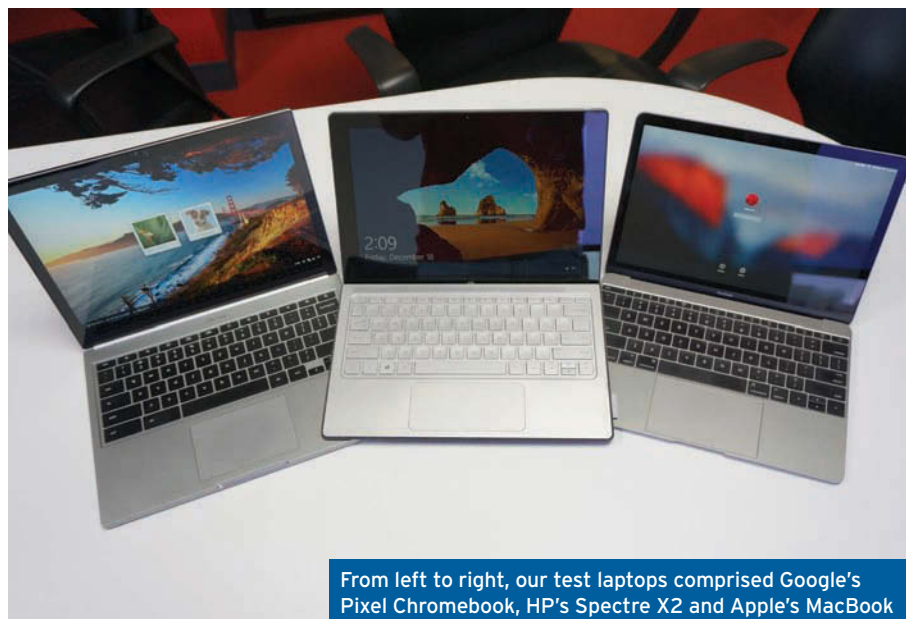
Our USB-C-powered devices comprised Apple's MacBook, Google's new Pixel Chromebook, HP's Spectre X2, and the Huawei-built Nexus 6P smartphone. We threw in a curve ball by including Innergie's PowerGear USB-C 45 charger, which is certified to work with Apple's MacBook.

For our first test, we took each device's charger, plugged it into another laptop and

then noted whether it would charge from within the operating system.

The MacBook's charger worked just fine with Google's new Pixel, and the same was true when we used the Chromebook's charger

on Apple's laptop. Innergie's PowerGear USB-C 45 worked with both devices, too. HP Spectre X2's ugly power brick powered the Pixel and MacBook. And all four larger bricks were able to charge the Nexus 6P, but



From left to right, our test laptops comprised Google's Pixel Chromebook, HP's Spectre X2 and Apple's MacBook



Apple's MacBook is on top an HP Spectre X2, with Google's second-generation Pixel at the bottom

interestingly, the Apple MacBook's charger would only power the phone at a standard rate, while the others elicited a 'Charging rapidly' screen.

Even more impressive, the tiny 15-watt Huawei Nexus 6P power adaptor had just enough juice to charge the MacBook - albeit at a much slower rate. The Pixel also accepted a charge from the phone's charger, though it flashed a warning that it was a 'Low-power charger' and that the laptop may not charge when powered up. We doubt you'd be able to charge any laptop that's under a heavy power load, but in a pinch, a USB-C phone charger could do the trick.

Where the universal dream falls short

There's always someone who spoils the party, and this time it was HP's Spectre X2. This reasonably-priced Surface Pro clone has two USB-C ports, and while it would charge with its own brick in either port, no other charger, including Innergie's aftermarket model, would give the Spectre X2 juice while it was on. This was the case even when the Spectre X2's battery was down to 10 percent.

After speaking with HP about the issue, it appears the company is just playing it safe. Fearing that a counterfeit or out-of-spec charger could make the touchscreen or audio subsystem flaky, HP has limited the access

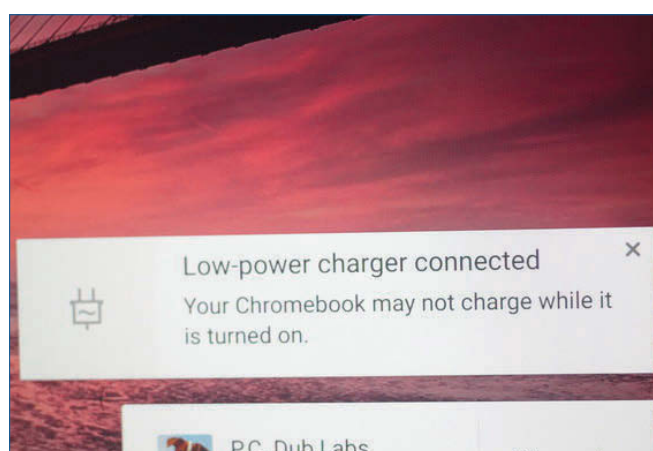
non-certified chargers have to the device. For now, HP exec Mike Nash told us, only "overnight" charging, or charging while the device is off, is supported.

"Are we being too conservative?" he asked. "I don't think so." It's not that HP doesn't believe in USB-C - it already has devices that use it for charging. The company just doesn't believe the spec is ready for interchangeability yet.

Lee Atkinson, a technologist at HP who's been leading the effort to corral PC makers around USB-C, said the upcoming Power Delivery 3.0 spec should solve many of the outstanding issues, such as how much voltage to supply and how to control which way power flows between two devices. For now, Power Delivery 3.0 is still a work in progress, but Atkinson said OEMs are all in agreement that it has to be done correctly and with group consensus.

We push harder on USB-C charging

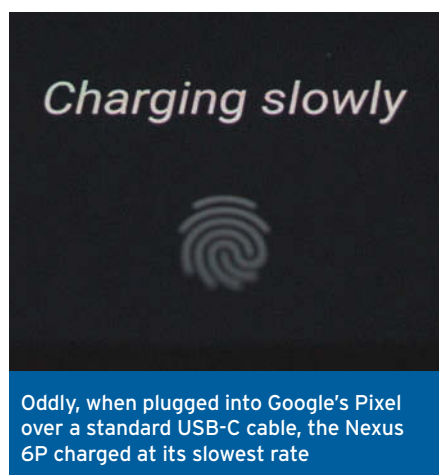
With the laptops taken care of, we took a closer look at the Nexus 6P, plugging it into



Plug a smartphone charger into the Google Pixel's USB-C port and it'll warn you that the device may not charge when on

each of the laptops using the stock USB-C cable to see what would happen. (The laptops were powered on and running on battery.) In all cases, the phone charged, but as we discovered with the power bricks, the Huawei's charge rate varied. On the Spectre X2 and the MacBook, the Nexus 6P charged at its presumably higher 'Charging rapidly' rate. On the Google Pixel, however, the phone reported 'Charging slowly', which suggests a step down from just 'Charging'.

CHARGER COMPATIBILITY	APPLE MACBOOK	GOOGLE PIXEL CHROMEBOOK	HP SPECTRE X2	HUAWEI NEXUS 6P
HP Spectre X2 charger	Charges	Charges	Charges	Charges rapidly
Apple MacBook charger	Charges	Charges	Does not charge	Charges
Google Pixel Chromebook charger	Charges	Charges	Does not charge	Charges rapidly
Huawei Nexus 6P charger	Charges	Charges	Does not charge	Charges rapidly
Innergie PowerGear USB-C 45 charger	Charges	Charges	Does not charge	Charges rapidly

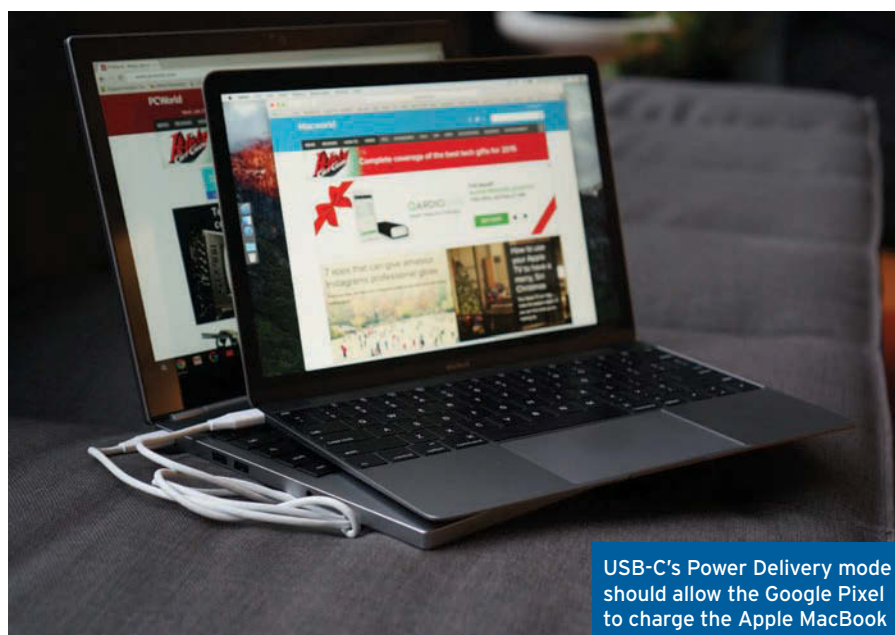
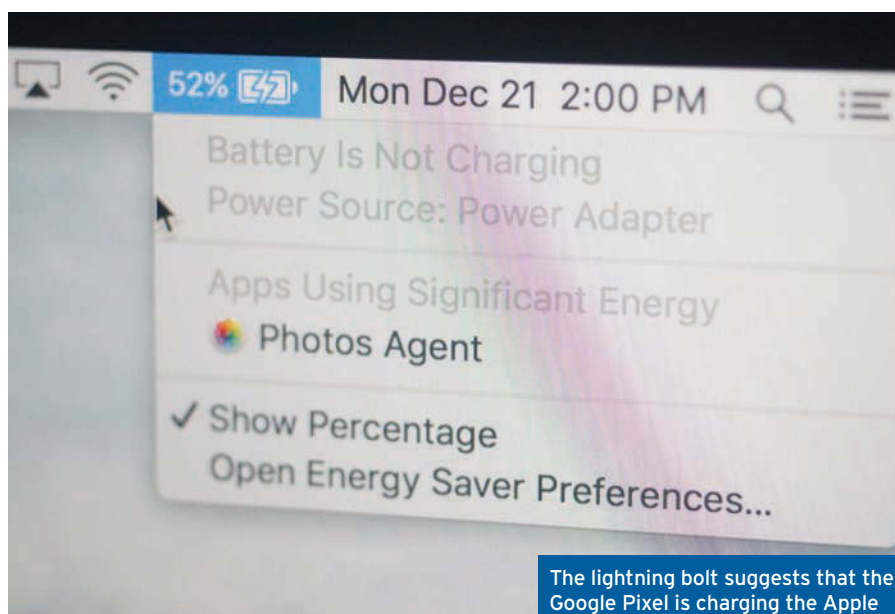


The discrepancies between the Nexus 6P's charging rate with the power bricks versus the standard cable is likely due to how much power the USB-C ports and chargers output.

Ever since Google's new Pixel came out, we've wondered what would happen if you plugged a separate USB-C charger into each of its USB-C ports. Like the Spectre X2, the Pixel can be charged from either port. We plugged the MacBook's charger into the left port and the Chromebook's adaptor into the right socket. Nothing caught on fire, but the Pixel is smart enough that you can pull a charger from either port and it won't skip a beat. We could, for example, unplug the Google charger and have it run on the Mac charger, and then plug the Google charger back in and unplug the Mac charger, without interruption.

HP mentioned that one of the issues still being worked out is what happens when you connect one laptop's USB-C port to another's. In theory, the Power Delivery allows you to charge a friend's laptop from yours, just as if you were jump-starting someone's car.

To put that to the test, we took the Google Pixel with its battery at 100 percent and plugged it into the MacBook at 61 percent. The charging icon on the laptop changed, but its battery continued to lose power, and the OS indicated that it wasn't charging at all.



Universal charging for laptops will be great someday, but we aren't there yet. In addition to waiting on the new USB Power

Delivery 3.0 spec, it'll take time for new designs and chargers to show up. We are, however, has us optimistic that it will happen. ☒

USB-C CHARGERS	APPLE MACBOOK	GOOGLE PIXEL CHROMEBOOK	HP SPECTRE X2	HUAWEI NEXUS 6P	INNERGIE POWERGEAR
14.5 volts	2 amps	x	x	x	x
5.2 volts	2.4 amps	x	x	x	x
5 volts	x	3 amps	2 amps	3 amps	3 amps
12 volts	x	3 amps	3 amps	x	3 amps
20 volts	x	3 amps	x		2.25 amps
15 volts	x	x	3 amps	x	3 amps
Wattage	29 watts	60 watts	45 watts	15 watts	45 watts

HOW MUCH DOES IT COST TO CHARGE A TABLET, PHONE OR LAPTOP?

Keeping your gadgets powered up is cheaper than you might think.
Jim Martin explains how much it costs to charge your tech

In the UK, we typically pay around 10p per kWh of electricity. This is the standard measurement of how much energy you use. Your monthly electricity bill shows how much you've used, and you can keep tabs on usage by looking at your electricity meter. If you want to measure how many watts a device draws

when charging (or in use) you can buy a power meter for around £10, which plugs into the mains socket and has a passthrough socket for the device in question. Its readout will tell you the current power draw, but it should also have a mode where it monitors power over time and offers an average power draw - useful in the case of laser

printers and other products that don't draw a constant amount of power.

Getting back to kWh, it stands for kilowatt hour. If you had a 1000-watt bulb and turned it on for an hour, it would use 1kWh (1000 watts = 1 kilowatt). Or, if you have a 2000-watt kettle, it will use 1kWh in 30 minutes. If you know how much power is being used by an appliance, you can work out how much it costs to use them.

Cost to charge an iPad

Let's use the new iPad Pro as an example. It takes 4.5 hours to charge from empty to full, and it has a 12W charger. So it will draw 12W for 4.5 hours, assuming you leave the tablet powered off and don't use it.

12W, in kilowatts is 0.012kW. So multiplying this by 4.5 hours is:

$$0.012 \times 4.5 = 0.054$$

So the iPad Pro uses 54W to charge. To work out the cost, it's a simple case of multiplying your cost per kilowatt by the amount of power used:





$$10 \times 0.054 = 0.54p$$

Yes, that's correct: half a penny. The yearly cost to charge an average tablet is roughly £1. As we said, it's less than you think.

We'll leave you to work out the cost of charging a phone - it's less than a tablet, of course - but we will offer an example calculation for the cost to charge a laptop.

Cost to charge a laptop

Taking the Dell XPS 13 as an example, it takes three hours to charge from empty to full. It has a 45W charger, so the calculation is as follows:

$$0.045 \times 3 = 0.135$$

$$10 \times 0.135 = 1.35p$$

And just for interest's sake, the average kettle draws 2.2kW (2200W) and takes two minutes and 30 seconds to boil one litre of water, enough for four cups of tea.

First convert minutes to hours:

$$2.5/60 = 0.0417$$

Then calculate the energy use:

$$2.2 \times 0.0417 = 0.917$$

$$10 \times 0.917 = 0.9p$$

So it costs about 1p in electricity.

Bear in mind that these figures don't include the 'standing charge', which is a

fixed fee most people pay their energy supplier in addition to the cost of the energy they actually use. This varies, but is around £100 per year, and obviously needs to be factored in to get the true cost of using any electrical appliance. If you're doing your own calculations, first check what you pay per kWh and the standing charge you pay. [\[X\]](#)





View your product key in Windows 10

Looking for your Windows 10 product key? Chances are you won't find it. Jim Martin reveals why

Microsoft appears to be doing away with product keys for Windows, and that's a good thing. While some people will have to buy a copy of Windows 10 (which will come with a product key to activate), the vast majority of computers won't have - or need - one. It's a welcome change, and one less thing to worry about.

If you upgraded from Windows 7 or 8, Windows 10 will have activated automatically after connecting to Microsoft's servers online. You didn't need to enter a product key as you were entitled to Windows 10 by virtue of having a genuine consumer copy of Windows 7 or 8. It's only after doing an upgrade that you can wipe your hard drive and perform a fresh install, but you won't need a product key to do this.

Why you don't need a product key to clean install Windows 10

Since Microsoft has your PC's 'digital signature' from the initial upgrade, it recognises the combination of components when you do a clean install and automatically activates Windows. This means you can safely skip the screen that asks for a product key at the start of the installation process. It's frustrating that no message tells you this: the screen is only for those installing a version of Windows 10 they've purchased and which therefore still requires a key.

Windows 10 should activate as long as you haven't made any major changes to your PC. Upgrading from a hard disk to an SSD won't affect anything, nor will changing your graphics card. However, upgrading your motherboard and processor will probably

count as 'significant' and you'll have to ring Microsoft's support line if you find that the operating system is no longer activated, or you're reinstalling it.

Find your Windows 10 product key

If you've tried to extract the key using a utility such as Belarc Advisor or Magical Jelly Bean Keyfinder, you might well think you have your key. But it's just a generic key used for a particular build of Windows 10 rather than one specific to your PC.

In short, then, if you upgraded to Windows 10, it doesn't have a product key, and you shouldn't ever need one.

If you bought a PC, laptop or tablet running Windows 10, then it should have a sticker or Certificate of Authenticity that contains the product key, or be included somewhere with the packaging or documentation that came with it. If you've purchased a boxed copy of the operating system, it will be on a label in the box. If you bought a digital copy of Windows 10 online from Microsoft, you should have received the product key in an email.

How to check if Windows 10 is activated

Right-click on the Start button and choose System from the menu that appears. Under Windows Activation, you should see 'Windows is activated'. Similarly, if you click on Settings on the Start Menu, then Update and Security, you will see a section called Activation. Click or tap on that, and you'll see the edition your computer is running and the activation status. ☑

Windows 10

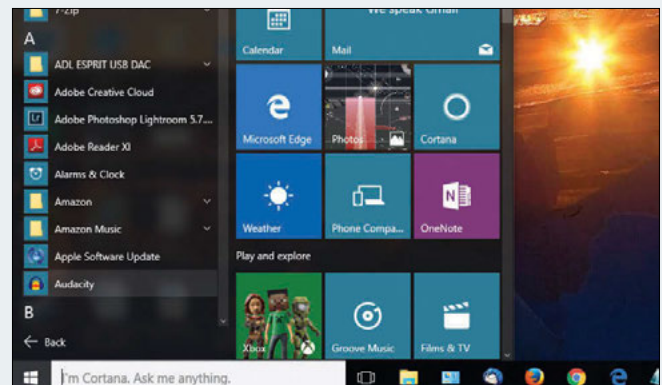
Run programs as administrator in Windows 10

Occasionally you'll need to run an app with admin privileges. Chris Martin explains how

Running a program or application as administrator in Windows 10 is simple and we'll show you how, but you might not want to do it every time. We'll also show you how to make sure you always run a program as administrator in Windows 10.

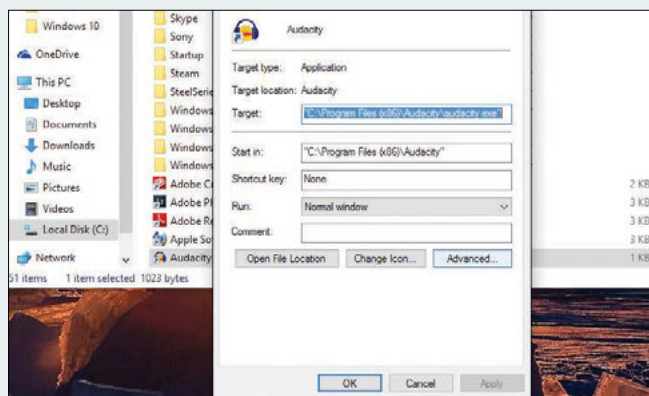
The simple way to run a program as an administrator in Windows 10 is to find the app you want to open in the Start Menu, right-click and select 'Run as administrator' within the More section. However, this only does it once, and you might want to open that application as an administrator every time.

Here are the steps you should follow if you always want to run a particular program as an administrator, though you should repeat only do so with applications with you trust and know how to use. Only run an app with administrator privileges if you really need to.

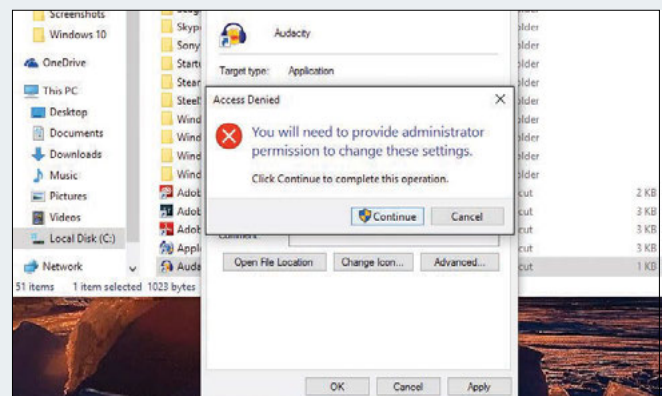


START

Find the app in the Start Menu under All apps. Click Open file location from within the More menu.



2 Right-click on the program and select Properties. Click Advanced within the Shortcut tab which is the default one.



3 Tick the Run as administrator box and click OK. Next, click OK on the main properties window and then press Continue. You may need your administrator to approve the change if you do not have sufficient privileges. ☒



Use Windows 10's Remote Desktop Connection

Martyn Casserly explains how to access a PC from another in a different location with Windows 10

Sometimes you might find yourself sitting at one computer, but needing the data or facilities on another. Or you may need to help a friend or family member solve a problem. Well, with Remote Desktop Connection in Windows 10 you can access another PC in another room, or even on a Wi-Fi-enabled beach. We'll show you how to set up this feature so you can control one PC using another.

Before you begin

Remote Desktop Connection isn't easy to set up when compared to services such as VNC or Team Viewer, which also offer remote access to PCs. If all you want is to view files on your hard drive, or help out friends and relatives with remote support, then we'd recommend these solutions as friendlier alternatives.

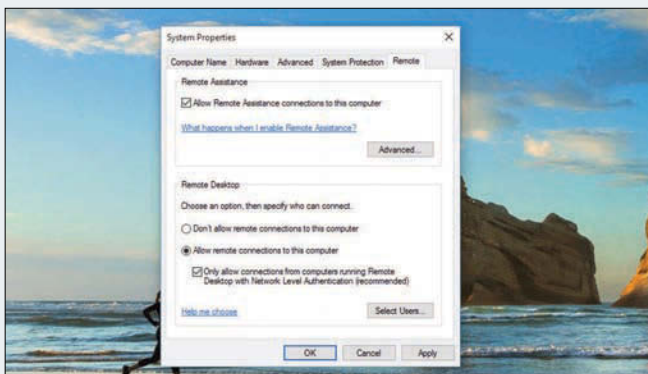
And with cloud storage being so affordable these days, not to mention cross platform, we'd also suggest that keeping your files on one of these services is an easier and more convenient way to embrace the online world in which we live. Remote Desktop Connection has some strong features, but in many cases we would be surprised if those mentioned above wouldn't do the job and save you a few grey hairs in the process.

Which versions of Windows can use Remote Desktop Connection?

While all version of Windows 10 can connect to another Windows 10 PC remotely, only Windows 10 Pro users can allow access to their computer. So if you have Windows 10 Home edition, you won't find any settings to enable Remote Desktop Connection on your PC, but you will still be able to connect to another PC running Windows 10 Pro.

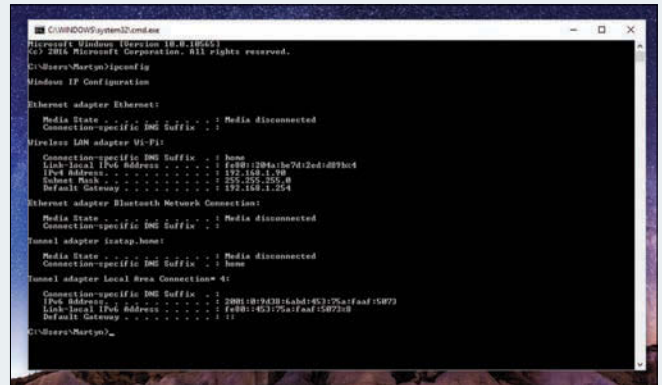
Allow access to the PC

In order to be able to use Remote Desktop Connection you'll first have to allow remote access to your target PC. To do this, Open File Explorer, find This PC and right-click to bring up the contextual menu. Now select Properties > Remote Settings and in the Remote Desktop section make sure that the Allow remote connections to this computer option is selected and untick the Allow connections only from computers running Remote Desktop with Network Level Authentication, as it can complicate the setup process. You can of course always return to it later to increase the security of your PC. Now click Apply and OK



Find the IP address

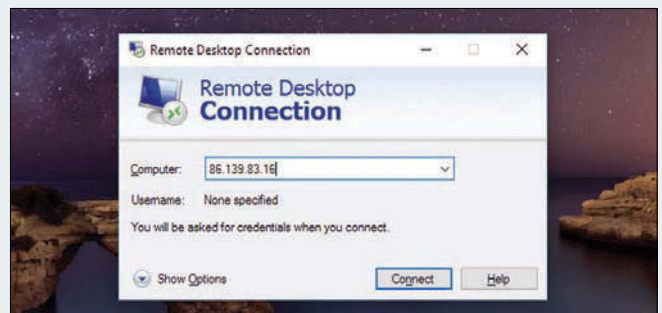
Before you can connect to your target PC, you'll need to know its IP address so that it can be found on the network. To do this hold down the Windows key and press R. In the box that appears, type **cmd** and press Enter. In the terminal windows that appears, type **ipconfig** and press Enter. You'll see a range of information appear, but the one you want is IPv4 Address. Note this down (it's a few numbers and full stops) and also write down the Default Gateway IP address.



The IPv4 address will let you access the PC on a local network, but if you want to access it from a WAN, then open up a browser and in the address bar type in **whatismyipaddress**, then make a note of the address.

Connect to a PC on the local network

Once you've set up the target PC to allow access and have the IP address all you need to do to connect is open the Windows Start Menu, search for Remote Desktop, select Remote Desktop Connection, then in the box that appear type the IP address and click Connect. You should be prompted for your username and password, then the PC should be available to you as if you were sitting in front of it.



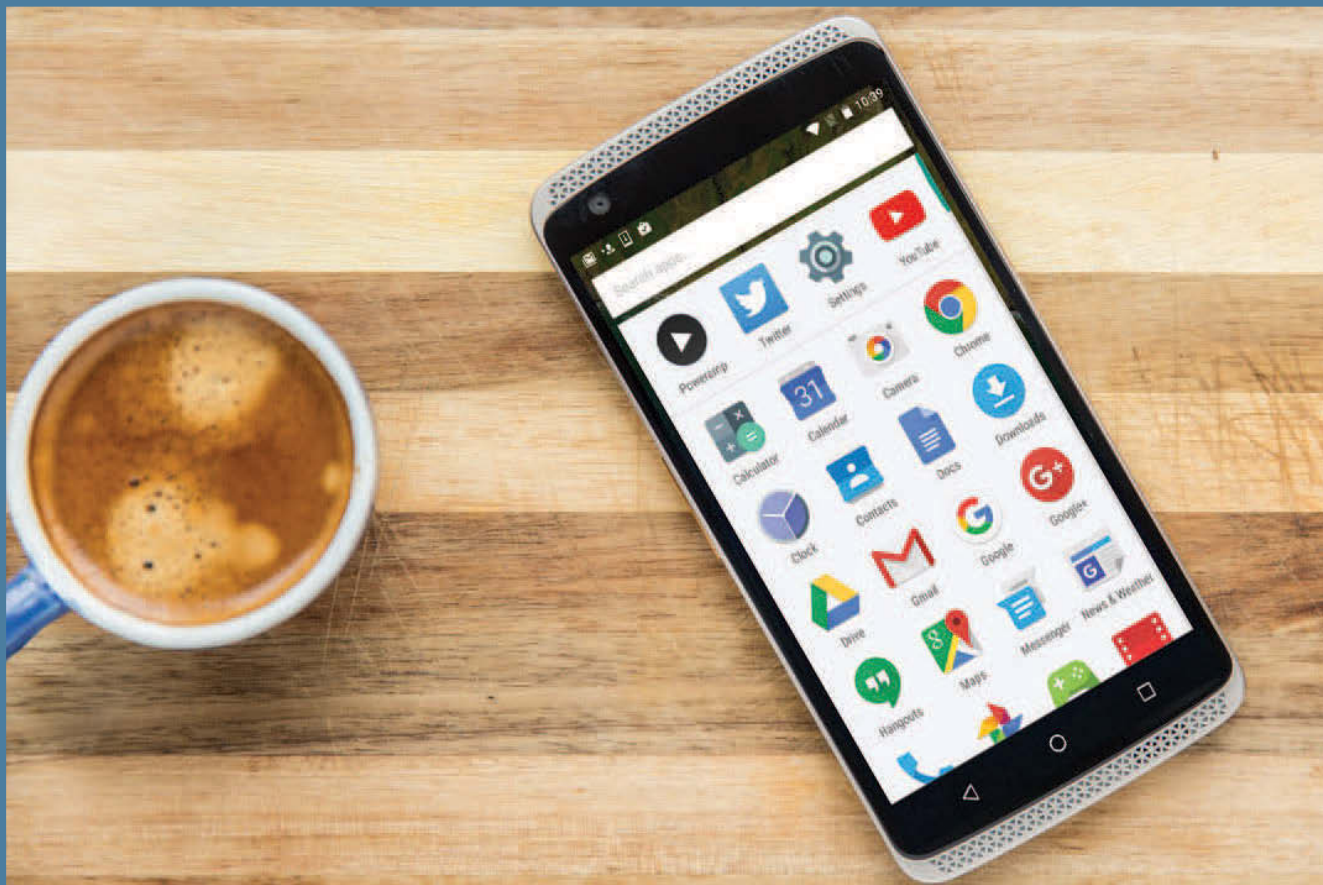
Connect to a PC over the internet

Things are a little more complicated if you want to access your PC when you're not on a local network. First, you'll need to make sure the Windows firewall isn't blocking Remote Desktop. Check this by opening up the Windows Firewall section of the Control Panel and selecting Allow apps to communicate through Windows Firewall.

Next, you'll need to configure your router so that it knows the correct addresses for your computers (do this using the Default Gateway and WAN settings you wrote down previously), and enable the Port Forward setting so that it opens port 3389. As router settings are different on every router.

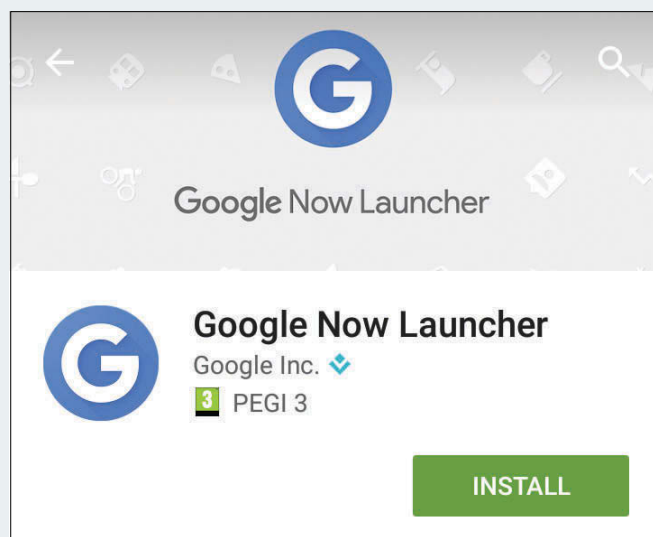
It's worth bearing in mind that if you intend to use the internet to connect to your PC on a regular basis, the external (WAN) IP address is subject to change. To avoid having to rediscover the address every time this happens, subscribe to a dynamic DNS service such as no-ip.com, as this gives you a memorable domain name to which you can connect, and will keep track of any changes to your external IP address. Many routers have built-in support for dynamic DNS, so have a look in your manual and select one of the services supported by your router.

With all of this completed, you should now be able to open the Windows Start Menu, search for Remote Desktop, select Remote Desktop Connection, then in the box that appear type the IP address and click Connect. Enter your username and password, then you should have full access to the target PC. ☑



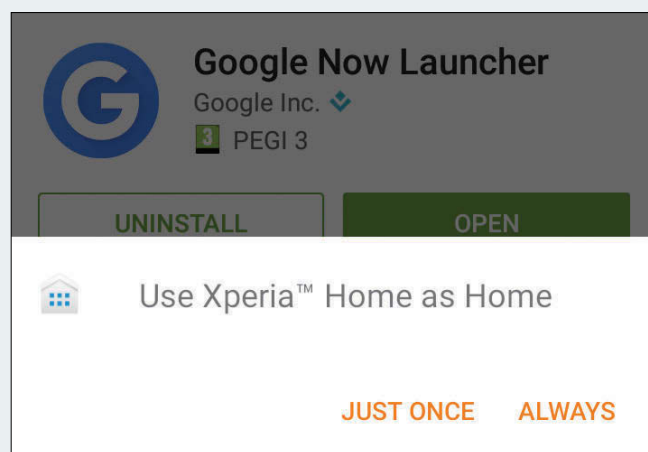
Get Marshmallow's app drawer on any phone

Marshmallow has a new app tray, but you don't need the new OS to use it. Marie Brewis shows how



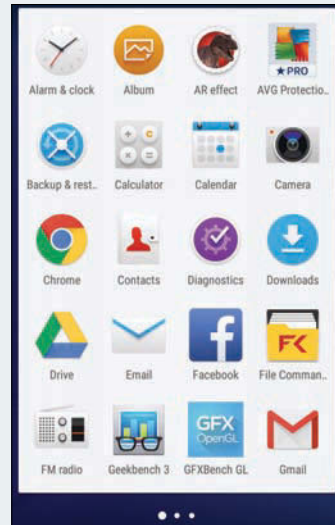
START

Launch the Google Play app on your phone and search for, download and install the Google Now Launcher.



2 Open the Google Now Launcher and you'll be prompted to decide whether you want to use it Just once or Always. You can choose Just once if you're not sure you'll like it, but it's easy to revert to the way you had things by uninstalling the Google Now Launcher if you opt for Always instead.

3 You'll immediately notice a change to your app tray, whereby all your apps are listed alphabetically and on a clean white background. But this isn't quite Android Marshmallow-style just yet.



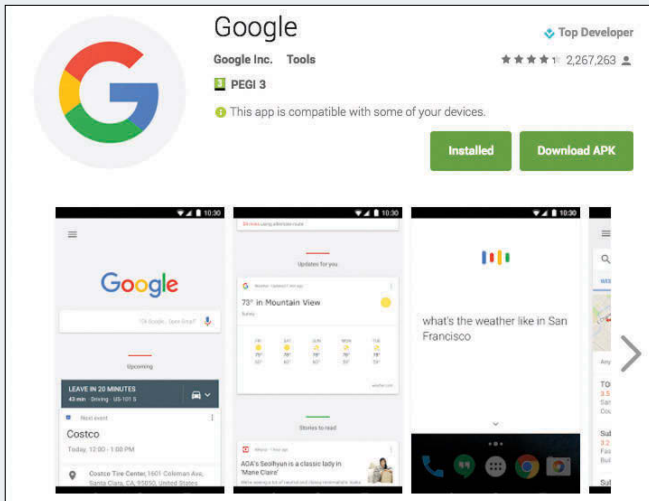
Google App

Do you want to install an update to this built-in application? Your existing data will not be lost. The updated application will get access to:

NEW

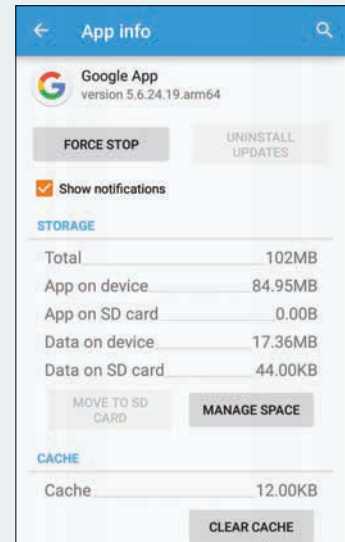
ALL

4 You'll need to download and install the latest Google App by sideloading its APK file. You can do so by plugging the phone into a PC or Mac and copying the APK file to its Downloads folder, then opening it on a File Manager app on your phone and tapping Install. (Note that you'll need to enable the ability to install apps from unknown sources in the Settings, Security menu first.)

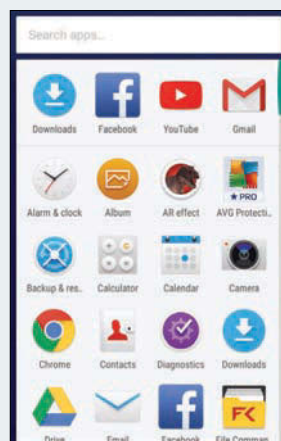


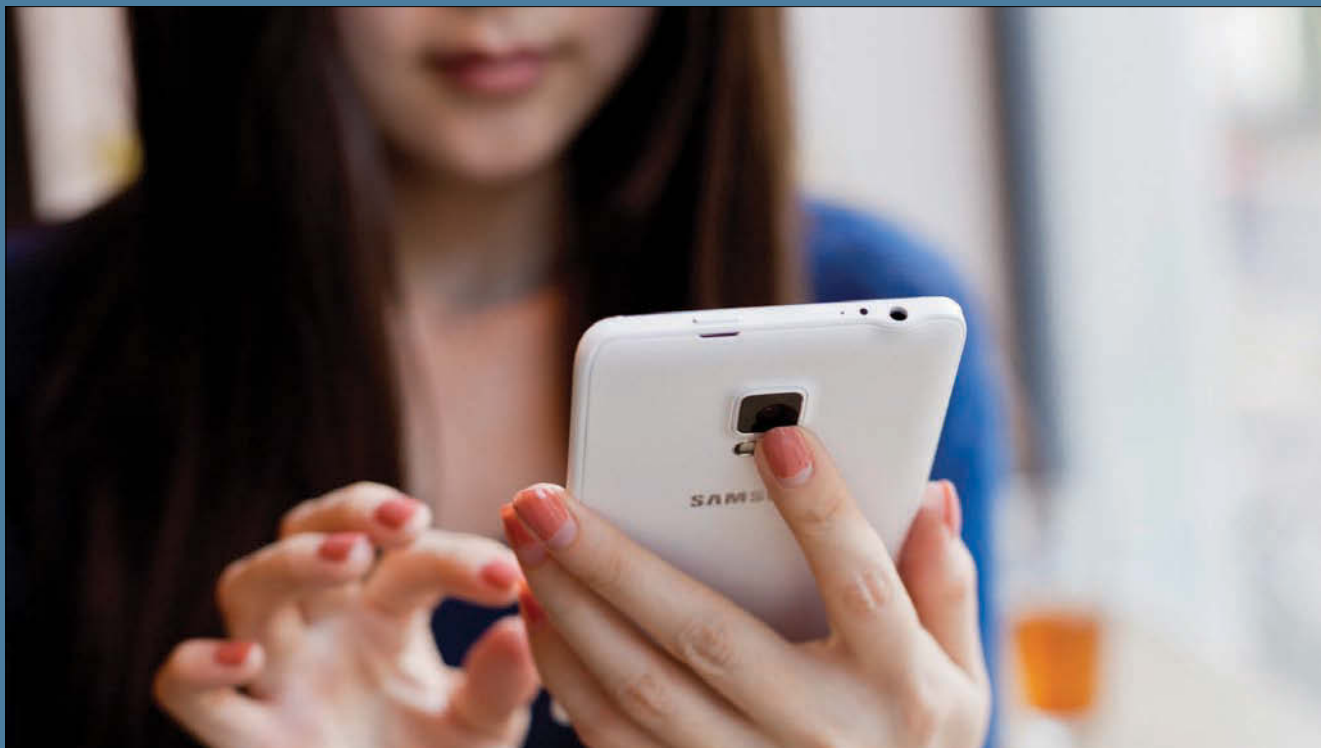
5 To get the latest Google App APK file you can do a simple Google search, or you can directly download from Google Play the latest version. To do so, you'll need to be running the Google Chrome browser with a APK Downloader installed (download one from tinyurl.com/oLrt9f8). Next, navigate to the Google App on Google Play (tinyurl.com/94nkwej) and hit the Download APK button.

6 On your phone go to Settings > Apps > Google Now Launcher and tap Clear Cache. Do the same for the Google App.



7 Open your app tray and you should now see your frequently used apps listed at the top, and an alphabetical list of the other apps installed on your phone below. ☒



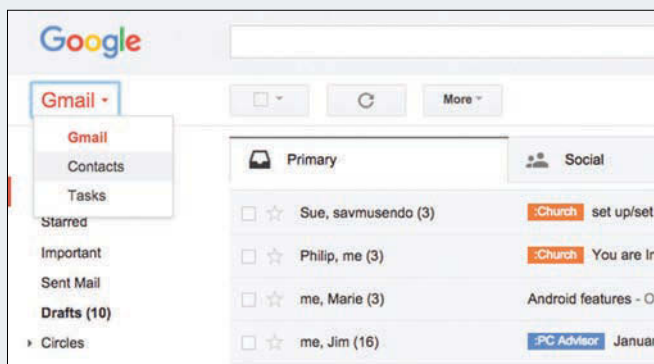


Recover deleted contacts from Android

Martyn Casserly reveals how you can use Gmail to recover lost contacts on an Android phone

Gmail

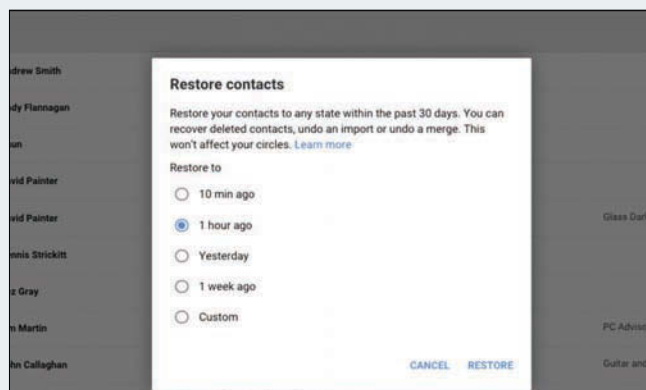
It might seem odd to look for your contacts in Gmail rather than on your phone, but as the services are intertwined there's a good chance you'll find what you're looking for here. When you add contacts into your Android phone using a Google service they are synched up with the online servers to hold a record. You can restore any contact that you've deleted in the past 30 days and Chat contacts from the previous 24 hours.



START

To recover the missing details you'll need to log on to the web version of Gmail, then in the top lefthand corner where you see the word Gmail. A drop-down menu will appear, from which you should select Contacts.

You'll now see all of the contacts that Google has attached to your account, this will include entries for email addresses and phone numbers. In the lefthand column you'll see a list of options. Click on More and then from the new headings that appear select Restore Contacts.



2

You'll be given the choice of when you want to roll back to (an hour, a day, a week, and so on), so choose a point when the missing data was still on your phone. Click Restore and you should find the previously lost contact now back in the list.

Other methods

If you don't have a Gmail account, or at least not one that you synch your contacts to, then recovering your data might be a little more difficult. There are several third-party apps that provide this service, which entails pulling the data from the deeper recesses of your handset's storage using a PC or Mac. From the offerings we've seen, Recovery Android looks to offer support for a wide range of devices, with an interface that is simple to learn.

You can also try searching Google for your specific device and the contact app you use, to see if there are any internal settings that might come to your rescue. ☒

PC ADVISOR DOWNLOADS ZONE

Welcome to the *PC Advisor* Software Downloads Zone

PC Advisor no longer comes with a software cover disc. We have instead created an online software download zone. Most software developers distribute their programs online rather than on CDs or DVDs. And more often than not in the past, developers required *PC Advisor* readers to use online registration, and increasingly demanded that software be downloaded rather than allowing them to be included on the cover disc. So despite there being a disc taped to the cover, there would often be little more than a link to download the software.

For these reasons, we've created a new Downloads Zone on our website. And to make things as easy as possible, we have removed the need for individual codes to download or register each program.

The only code you'll need is **DOWNLOAD1215**, which you can enter at the following page:

pcadvisor.co.uk/magazine/download

Once logged in, you'll be able to browse the software on offer or search for something specific using the search box, or click the Downloads link at the top of each page and browse by category.

The Downloads Zone has hundreds of great programs and apps that are just a click or two away.

The screenshot shows the PC Advisor website's 'Reader Software Downloads Zone'. The header includes the PC Advisor logo and navigation links for various tech categories. The main section is titled 'Reader Software Downloads Zone' and features a list of software products available for download. Each product entry includes an icon, the product name, a brief description, a 'Download' button, and a star rating. The products listed are CyberLink PhotoDirector 7 Ultra, CyberLink PhotoDirector 7 Suite, CyberLink PowerDirector 14 Ultimate, CyberLink PowerDirector 14 Ultra, and Auslogics BoostSpeed 8.0.2.0. To the right of the product list, there are sections for 'TRENDING' articles and a 'TRENDING VIDEO' section, each with a thumbnail image and a brief description.

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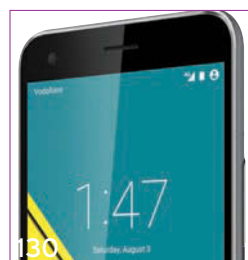
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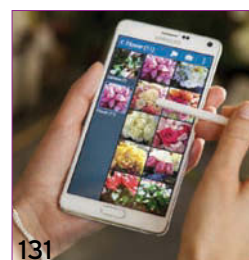
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Manufacturers are under no obligation to feature reviewed products on their websites. Our recommendations are for guidance only.

Star ratings and Gold, Recommended and Best Buy badges are awarded at the time of the original review and given in relation to the market competition at that time.

Best laptops	    				
	Dell XPS 13 9350	Asus ZenBook UX303U	Alienware 13	Apple MacBook Pro Retina 15in	Dell Inspiron 15 7559
Price	£1,720 inc VAT	£899 inc VAT	£1,100 inc VAT	£1,599 inc VAT	£999 inc VAT
Website	Dell.co.uk	Asus.com/uk	Alienware.co.uk	Apple.com/uk	Dell.co.uk
Build rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Features rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Performance rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Value rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Processor	2.2GHz Intel Core i5-5200U	2.5GHz Intel Core i7-6500U	2.4GHz Intel Core i7-5500U	2.2GHz Intel Core i7	2.6GHz Intel Core i7-6700HQ
RAM	8GB DDR3	12GB DDR3	8GB (2x 4GB) DDR3	16GB DDR3L	16GB DDR3L RAM
Storage	128GB SSD	256GB SSD	256GB SSD	256GB SSD	128GB SSD, 1TB HDD
Screen size	13.3in matt IPS	13.3in matt	13.3in matt	15.4in matt	13.6in IPS
Screen resolution	1920x1080	1920x1080	1920x1080	2880x1800	3840x2160
Graphics	Intel HD Graphics 5500	Intel HD Graphics 520	nVidia GeForce GTX 860M	Intel Iris Pro Graphics	nVidia GeForce GTX 960M
Video memory	N/A	N/A	2GB	N/A	N/A
Wireless	802.11ac	802.11ac	802.11ac	802.11a/b/g/n/ac	802.11ac 1x1 MIMO
Ethernet	Gigabit	Gigabit	Gigabit	Gigabit	Gigabit
Bluetooth	✓	✓	✓	✓	✓
USB	2x USB 3.0	3x USB 3.0	3x USB 3.0	2x USB 3.0	3x USB 3.0
FireWire	✗	✗	✗	✗	✗
Thunderbolt	✓	✗	✗	✓	✗
DisplayPort	✓	✓	✓	✗	✗
HDMI	✗	✓	✓	✓	✓
DVI	✗	✗	✗	✗	✗
VGA	✗	✗	✗	✗	✗
eSATA	✗	✗	✗	✗	✗
Media card slot	✓	✓	✗	✓	✓
Audio	Headphone jack, mic	Headphone jack, mic	Headphone jack, mic	Headphone jack, mic	Headphone jack, mic
Optical drive	N/A	N/A	N/A	N/A	N/A
Extras	720p webcam	0.9Mp webcam	2Mp webcam	720p FaceTime	0.9Mp webcam
Operating system	Windows 10 Home	Windows 10 Home	Windows 8.1	OS X Yosemite	Windows 10 Home
Bundled software	None	None	None	None	None
Gaming scores	24.5/17.9fps in Tomb Raider	38/30fps in Tomb Raider	89/64fps in Tomb Raider	Not tested	34/27fps in Tomb Raider
Battery	Not stated	50Wh lithium-polymer	52Wh lithium-polymer	74.9Wh lithium-ion	74Wh lithium-ion
Battery life	Not tested	7 hrs 48 mins	10 hrs 20 mins	8 hrs 58 mins	5 hrs 27 mins
PCMark7 score	Not tested	Not tested	5429	Not tested	Not tested
Dimensions	304x200x15mm	322x222x19.4mm	328x235x26.7mm	358.9x247.1x18mm	383x265x26.1mm
Weight	1.3kg	1.4kg	2kg	2kg	2.8kg
Warranty	2-year return-to-base	1 year	1-year collect-and-return	1-year return-to-base	1 year
FULL REVIEW	TINYURL.COM/ZZF4ZQ2	TINYURL.COM/ZLHLJDO	TINYURL.COM/O8VXAGL	TINYURL.COM/O6U4NCR	TINYURL.COM/ZZV3JQZ

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Best budget laptops	1	2	3	4	5
	HP 255 G4	Asus X555LA-XX290H	Toshiba Chromebook 2	Dell Vostro 15	Toshiba Satellite CL10-B-100
Price	£269 inc VAT	£300 inc VAT	£269 inc VAT	£442 inc VAT	£200 inc VAT
Website	Hp.com/uk	Asus.com/uk	Toshiba.co.uk	Dell.co.uk	Toshiba.co.uk
Build rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Features rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Performance rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Value rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Overall rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Processor	2.2GHz AMD A8-7410	1.9GHz Intel Core i3-4030U	Intel Celeron	2.2GHz Intel Core i5-5200U	100
RAM	4GB DDR3	4GB DDR3	4GB DDR3	4GB DDR3	2GB DDR3
Storage	1TB HDD	1TB HDD	16GB SSD	500GB SSD	32GB eMMC
Screen size	15.6in matt	15.6in glossy	13.3in IPS	15.3in matt	11.6in glossy
Screen resolution	1366x768	1366x768	1920x1080	1366x768	1366x768
Graphics	AMD Radeon 5	Intel HD Graphics 4400	Intel HD Graphics	Intel HD Graphics 5000	Intel HD Graphics
Video memory	N/A	N/A	N/A	N/A	N/A
Wireless	802.11b/g/n	802.11b/g/n	802.11a/b/g/n/ac	802.11b/g/n/ac	802.11b/g/n
Ethernet	Gigabit	Gigabit	Gigabit	Gigabit	Gigabit
Bluetooth	✓	✓	✓	✓	✓
USB	1x USB 3.0, 2x USB 2.0	1x USB 3.0, 2x USB 2.0	1x USB 3.0, 1x USB 2.0	1x USB 3.0, 2x USB 2.0	1x USB 3.0, 1x USB 2.0
FireWire	x	x	x	x	x
Thunderbolt	x	x	x	x	x
DisplayPort	x	x	x	x	x
HDMI	✓	✓	✓	✓	✓
DVI	x	x	x	x	x
VGA	✓	✓	x	x	x
eSATA	x	x	x	x	x
Media card slot	✓	x	✓	✓	x
Audio	Headphone minijack	Headphone minijack	Headphone minijack	Headphone minijack	Headphone minijack
Optical drive	DVD±RW	DVD±RW	None	None	None
Extras	Kensington lock slot, webcam	Kensington lock slot, webcam	Webcam	Kensington lock slot, webcam	Kensington lock slot, webcam
Operating system	Windows 8.1 Pro	Windows 8.1	Google Chrome OS	Windows 8.1	Windows 8.1 with Bing
Bundled software	None	None	None	None	None
Battery	31Wh Lithium-ion	37Wh Lithium-ion	Not specified	40Wh Lithium-polymer	26Wh Lithium-ion
Battery life	4 hrs 6 mins	5 hrs 17 mins	9 hrs	5 hrs 17 mins	6 hrs
PCMark 8 Home score	1863	1985	Not tested	2296	Not tested
Batman (Low/High)	28fps/Not tested	30fps/Not tested	Not tested	29fps/Not tested	Not tested
Dimensions	385x255x24.6mm	381x257x26.3mm	320x214x19.3mm	1378x259x24.5mm	315x216x20.3mm
Weight	2.1kg	2.1kg	1.4kg	2.4kg	1.1kg
Warranty	1 year	1-year return-to-base	1 year	1 year	1 year
FULL REVIEW	TINYURL.COM/GWWV8TH	TINYURL.COM/OMYZQJ3	TINYURL.COM/OP9NQAY	TINYURL.COM/NDAX6WT	TINYURL.COM/OQC4PUO

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Best ultraportable laptops	    				
	1	2	3	4	5
	Apple MacBook Pro Retina 13in	HP EliteBook Folio 1040 G1	Apple MacBook Air 13in	Dell XPS 13 9350	Microsoft Surface Pro 4
Price	£999 inc VAT	£2,116 inc VAT	£849 inc VAT	£1,720 inc VAT	£749 inc VAT
Website	Apple.com/uk	Hp.com/uk	Apple.com/uk	Dell.co.uk	Microsoft.com/en-gb
Build rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Features rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Performance rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Value rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Processor	2.7GHz Intel Core i5	2.1GHz Intel Core i5-4600U	1.6GHz Intel Core i5	2.2GHz Intel Core i5-5200U	Intel Core m3
RAM	8GB LPDDR3	8GB DDR3L	4GB LPDDR3	8GB DDR3	4GB
Storage	128GB SSD	256GB SSD	128GB SSD	128GB SSD	128GB SSD
Screen size	13.3in matt	14in matt	13.3in glossy	13.3in matt IPS	12.3in PixelSense
Screen resolution	2560x1600	1920x1080	1440x900	1920x1080	2736x1824
Graphics	Intel Iris Graphics 6100	Intel HD Graphics 4400	Intel HD Graphics 6000	Intel HD Graphics 5500	Intel HD Graphics 515
Video memory	N/A	N/A	N/A	N/A	N/A
Wireless	802.11a/b/g/n/ac	802.11a/b/g/ac	802.11a/b/g/n/ac	802.11ac	802.11a/b/g/n
Ethernet	Gigabit	Gigabit	None	Gigabit	None
Bluetooth	✓	✓	✓	✓	✓
USB	2x USB 3.0	2x USB 3.0	2x USB 3.0	2x USB 3.0	1x USB 3.0
FireWire	x	x	✓	x	x
Thunderbolt	x	x	✓	✓	x
DisplayPort	x	✓	x	✓	✓
HDMI	✓	x	x	x	x
DVI	x	x	x	x	x
VGA	x	x	x	x	x
eSATA	x	x	x	x	x
Media card slot	✓	✓	✓	✓	✓
Audio	Headphone jack, mic	Headphone jack, mic	Headphone jack, mic	Headphone jack, mic	Headphone jack, mic
Optical drive	N/A	N/A	N/A	N/A	N/A
Extras	720p FaceTime	0.9Mp webcam	720p FaceTime	720p webcam	5Mp front/8Mp rear camera
Operating system	OS X Yosemite	Windows 7 Professional	OS X Yosemite	Windows 10 Home	Windows 10 Pro
Bundled software	None	None	None	None	None
Gaming scores	Not tested	49/33fps in Tomb Raider	Not tested	24.5/17.9fps in Tomb Raider	Not tested
Battery	74.9Wh lithium-ion	42Wh lithium-polymer	38Wh lithium-ion	Not stated	Not stated
Battery life	17 hrs 5 mins	5 hrs 41 mins	12 hrs 49 mins	Not tested	11 hrs 2 mins
PCMark 7 score	Not tested	4783	Not tested	Not tested	Not tested
Dimensions	314x219x18mm	338x232x17.3mm	300x192x17mm	304x200x15mm	292x201x8.45mm
Weight	1.6kg	1.6kg	1.4kg	1.3kg	766g
Warranty	1-year return-to-base	2-year return-to-base	1-year return-to-base	2-year return-to-base	1-year return-to-base
FULL REVIEW	TINYURL.COM/NG98LD4	TINYURL.COM/OWV2FRR	TINYURL.COM/PH3YN5K	TINYURL.COM/ZZF4ZQ2	TINYURL.COM/HE9UYXU

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Best Chromebooks	1	2	3	4	5
	Toshiba Chromebook 2	Acer Chromebook 13	Dell Chromebook 11	HP Chromebook 14	Acer C720p Chromebook
Price	£269 inc VAT	£219 inc VAT	£239 inc VAT	£259 inc VAT	£249 inc VAT
Website	Toshiba.co.uk	Acer.co.uk	Dell.co.uk	Hp.com/uk	Uk.asus.com
Build rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Features rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Performance rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Value rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Processor	Intel Celeron	2.1GHz nVidia Tegra K1	1.4GHz Intel Celeron 2955U	1.4GHz Intel Celeron 2955U	1.4GHz Intel Celeron 2955U
RAM	4GB DDR3	4GB DDR3	4GB DDR3	4GB DDR3	2GB DDR3
Storage	16GB SSD	32GB SSD	16GB SSD	16GB SSD	16GB SSD
Screen size	13.3in IPS	13.3in	11.6in glossy	14in glossy	11.6in glossy
Screen resolution	1920x1080	1920x1080	1366x768	1366x768	1366x768
Graphics	Intel HD graphics	nVidia Kepler	Intel HD Graphics	Intel HD graphics	Intel HD graphics
Video memory	N/A	N/A	N/A	N/A	N/A
Wireless	802.11a/b/g/n/ac	802.11a/b/g/n/ac	802.11a/b/g/n	802.11a/b/g/n	802.11a/b/g/n
Ethernet	Gigabit	Gigabit	Gigabit	Gigabit	Gigabit
Bluetooth	✓	✓	✓	✓	✓
USB	1x USB 3.0, 1x USB 2.0	2x USB 3.0	2x USB 3.0	2x USB 3.0, 1x USB 2.0	1x USB 3.0, 1x USB 2.0
FireWire	✗	✗	✗	✗	✗
Thunderbolt	✗	✗	✗	✗	✗
DisplayPort	✗	✗	✗	✗	✗
HDMI	✓	✓	✓	✓	✓
DVI	✗	✗	✗	✗	✗
VGA	✗	✗	✗	✗	✗
eSATA	✗	✗	✗	✗	✗
Media card slot	✓	✓	✓	✓	✓
Audio	Headphone minijack	Headphone minijack	Headphone minijack	Headphone minijack	Headphone minijack
Optical drive	N/A	N/A	N/A	N/A	N/A
Extras	Webcam	Webcam	Webcam	Webcam	Webcam
Operating system	Google Chrome OS	Google Chrome OS	Google Chrome OS	Google Chrome OS	Google Chrome OS
Bundled software	None	None	None	None	None
Battery life	9 hrs	9 hrs 20 mins	7 hrs 17 mins	7 hrs 50 mins	6 hrs 7 mins
SunSpider score	Not tested	660ms	465ms	470ms	502ms
Peacekeeper score	Not tested	Not tested	2468	2478	2453
Browsermark score	Not tested	Not tested	3732	3643	3698
Dimensions	320x214x19.3mm	18x327x227.5mm	295x201x24mm	20.5x345x239mm	19.1x288x204mm
Weight	1.4kg	1.5kg	1.3kg	1.7kg	1.4kg
Warranty	1 year	1 year	1 year	1 year	1 year
FULL REVIEW	TINYURL.COM/OP9NQAY	TINYURL.COM/Q2YT5AD	TINYURL.COM/M3D3QJ4	TINYURL.COM/OCU7FTY	TINYURL.COM/O9KFZMA

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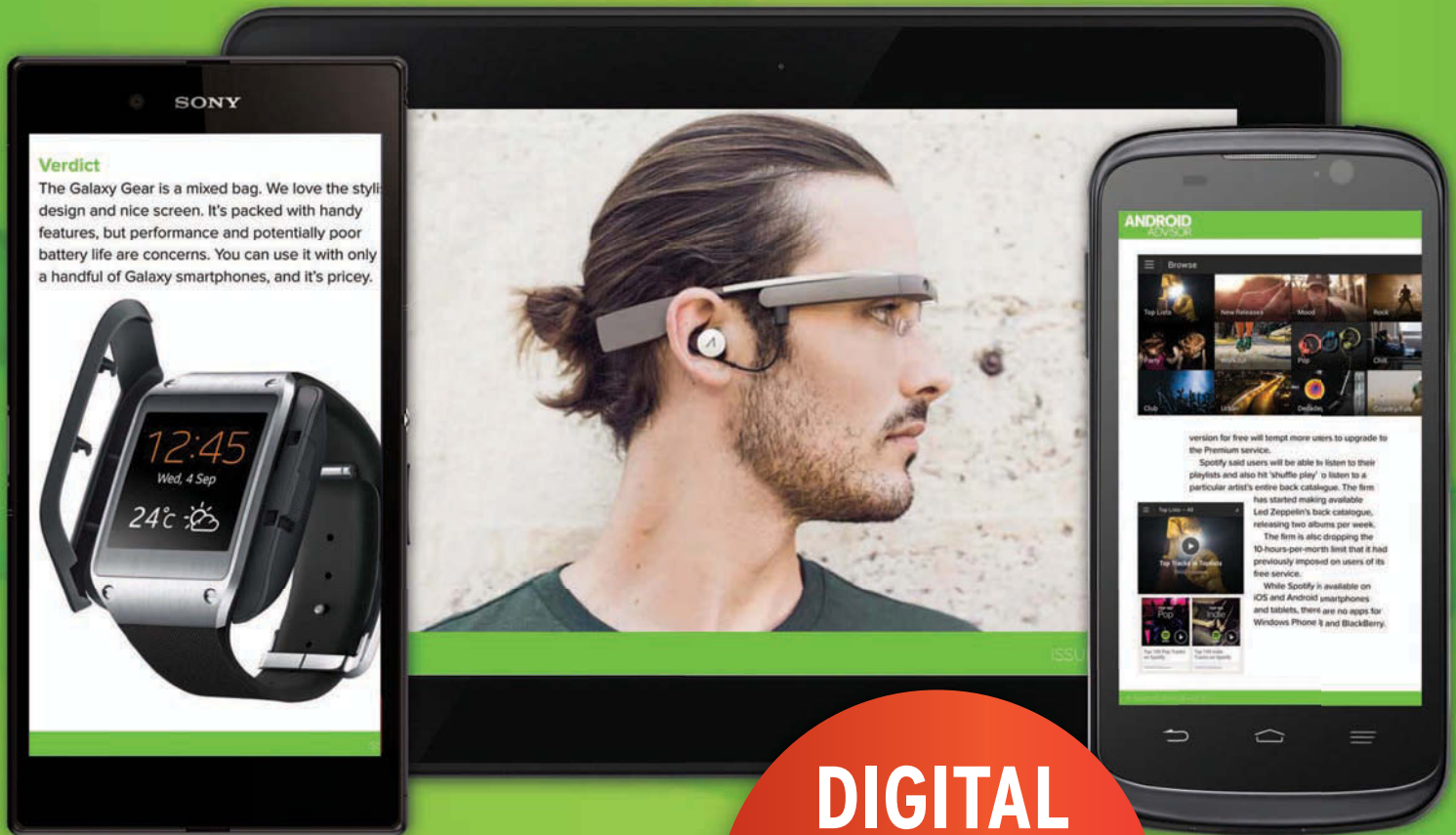
Best gaming laptops	    				
	1	2	3 PC ADVISOR RECOMMENDED	4	5
	Asus G501JW	Schenker XMG U506	Alienware 13	Dell Inspiron 15 7559	Toshiba Satellite P50T-C109
Price	£1,299 inc VAT	£1,585 inc VAT	£1,100 inc VAT	£999 inc VAT	£799 inc VAT
Website	Asus.com/uk	Mysn.co.uk	Alienware.co.uk	Dell.co.uk	Toshiba.co.uk
Build rating	★★★★★☆☆	★★★★★☆☆	★★★★★☆☆	★★★★★☆☆	★★★★★☆☆
Features rating	★★★★★☆☆	★★★★★☆☆	★★★★★☆☆	★★★★★☆☆	★★★★★☆☆
Performance rating	★★★★★☆☆	★★★★★☆☆	★★★★★☆☆	★★★★★☆☆	★★★★★☆☆
Value rating	★★★★★☆☆	★★★★★☆☆	★★★★★☆☆	★★★★★☆☆	★★★★★☆☆
Overall rating	★★★★★☆☆	★★★★★☆☆	★★★★★☆☆	★★★★★☆☆	★★★★★☆☆
Processor	2.6GHz Intel Core i7-4720HQ	3.5GHz Intel Core i5-6600K	2.4GHz Intel Core i7-5500U	2.6GHz Intel Core i7-6700HQ	2.2GHz Intel Core i5-5200U
RAM	8GB DDR3	8GB (2x 4GB) DDR3	8GB (2x 4GB) DDR3	16GB DDR3L RAM	12GB (1x 8GB, 1x 4GB) DDR3
Storage	512GB x4 SATA SSD	256GB SSD, 1TB HDD	256GB SSD	128GB SSD, 1TB HDD	1TB SHDD
Screen size	15.6in matt	15.6in matt	13.3in matt	13.6in IPS	15.6in matt
Screen resolution	3840x2160	1920x1080	1920x1080	3840x2160	3840x2160
Graphics	nVidia GeForce GTX 960M	nVidia GeForce GTX 970M	nVidia GeForce GTX 860M	nVidia GeForce GTX 960M	nVidia GeForce GTX 950M
Video memory	Not specified	Not specified	2GB	N/A	Not specified
Wireless	802.11ac	802.11ac	802.11ac	802.11ac 1x1 MIMO	802.11ac
Ethernet	Gigabit	Gigabit	Gigabit	Gigabit	Gigabit
Bluetooth	✓	✓	✓	✓	✓
USB	3x USB 3.0	3x USB 3.0, 1x eSATA/USB 3.0	3x USB 3.0	3x USB 3.0	3x USB 3.0
FireWire	x	x	x	x	x
Thunderbolt	✓	x	x	x	x
DisplayPort	x	✓	✓	x	✓
HDMI	✓	✓	✓	✓	x
DVI	x	x	x	x	x
VGA	x	x	x	x	x
eSATA	x	x	x	x	x
Media card slot	✓	✓	x	✓	✓
Audio	Headphone jack, mic	Headphone jack, mic	Headphone jack, mic	Headphone jack, mic	Headphone jack, mic
Optical drive	None	None	None	N/A	BD-RE/DVD±RW
Extras	0.9Mp webcam	2Mp webcam	2Mp webcam	0.9Mp webcam	0.9Mp webcam
Operating system	Windows 8.1	Windows 8.1 Pro	Windows 8.1	Windows 10 Home	Windows 8.1
Bundled software	None	None	None	None	None
Gaming scores	51/34fps in Tomb Raider	113/58fps in Tomb Raider	89/64fps in Tomb Raider	34/27fps in Tomb Raider	35/32fps in Tomb Raider
Battery	96Wh lithium-ion	82Wh lithium-polymer	52Wh lithium-polymer	74Wh lithium-ion	44Wh lithium-polymer
Battery life	4 hrs 30 mins	2 hrs 23 mins	10 hrs 20 mins	5 hrs 27 mins	3 hrs 20 mins
PCMark 7 score	3018 (PCMark 8)	4000 (PCMark 8)	5429	Not tested	1797 (PCMark 8)
Dimensions	381x255x20.6mm	387x266x37.5mm	328x235x26.7mm	383x265x26.1mm	380x257x23.7mm
Weight	2kg	3.4kg	2kg	2.8kg	2.3kg
Warranty	1 year	1 year	1-year collect-and-return	1 year	1 year
FULL REVIEW	TINYURL.COM/GR8KVAL	TINYURL.COM/NT6UUKF	TINYURL.COM/O8VXAGL	TINYURL.COM/ZZV3JQZ	TINYURL.COM/QZ8E7GW

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Best gaming PCs	1	2	3	4	
	PC ADVISOR RECOMMENDED	PC ADVISOR RECOMMENDED		PC ADVISOR RECOMMENDED	
	Wired2Fire Diablo Skylake	Chillblast Fusion Krypton	Vibox Spawn X	Mesh Elite Skylake PCA	Eclipse SuperNova i566n9700C
Price	£899 inc VAT	£869 inc VAT	£979 inc VAT	£999 inc VAT	£899 inc VAT
Website	Wired2fire.co.uk	Chillblast.com	Vibox.co.uk	Meshcomputers.co.uk	Eclipsecomputers.com
Build rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Features rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Performance rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Value rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Processor	3.5GHz Intel Core i5-6600K (OC 4.4GHz)	3.5GHz Intel i5-6600K (OC 4.2GHz)	3.5GHz Intel Core i5-6600K (OC 4.5GHz)	3.5GHz Intel Core i5-6600K (OC 4.4GHz)	3.5GHz Intel Core i5-6600K (4.2GHz OC)
CPU cooler	Prolimatech Basic 68	Akasa Nero	Coolermaster Seidon 120v	Raijintek Triton 240mm AIO Water Cooling Solution	Zalman CNPS11X Performa
Memory	16GB DDR4	16GB DDR4	8GB Patriot Viper Xtreme	16GB DDR4	16GB DDR4
Storage	1TB HDD + 250GB SSD	2TB HDD + 128GB SSD	2TB HDD + 240GB SSD	1TB SSHD + 250GB SSD	1TB HDD + 240GB SSD
Power supply	500W FSP	600W Aerocool Integrator	650W Superflower HX65	750W FSP Quiet Power Supply	500W Corsair VS Series
Motherboard	Asus Z170-P	Asus Z170M-Plus	MSI Z170A Gaming Pro	Gigabyte GA-Z170X-Gaming 3	Asus Z170-P
Operating system	Windows 10 Home	Windows 10 Home	Windows 10 Home	Windows 10 Home	Windows 10 Home
Screen	Asus VS247HR	28in AOC U2868Pqu	None supplied	None supplied	26in HKC 2615
Graphics	MSI nVidia GeForce GTX 970	MSI nVidia GeForce GTX 970	MSI nVidia GeForce GTX 970	Palit nVidia GeForce GTX 970	Palit nVidia GeForce GTX 970
Sound	Onboard	Onboard	Onboard	Onboard	Onboard
Connectivity	Gigabit ethernet	Gigabit ethernet	Gigabit ethernet	Gigabit ethernet	Gigabit ethernet
Ports	1x USB 3.1 Type-C, 4x USB 3.0, 4x USB 2.0	1x USB 3.1 Type-C, 3x USB 3.0, 4x USB 2.0, 2x DVI, HDMI, 2x DP	2x USB 3.1 Gen2, 6x USB 3.1 Gen1, 6x USB 2.0	3x USB 3.0, 2x USB 2.0, USB 3.1 Type-A, USB 3.1 Type-C, HDMI, DVI-D, D-Sub	1x USB 3.1 Type-C, 3x USB 3.0, 3x USB 2.0, DVU, HDMI, 2x DP
Optical drive	DVD±RW	None	DVD±RW	DVD±RW	DVD±RW
Case	Zalman Z11 Neo	Chillblast Kube	Phanteks Enthoo Pro Mid	Aero Cool DS 200	Corsair Carbide Spec-03
Keyboard & mouse	Cooler Master Devastator Keyboard and Mouse	Thermaltake E-Sports Commander Gaming Set	Cooler Master Devastator Keyboard and Mouse	Roccat Isku Keyboard, Roccat Lua Mouse	Thermaltake E-Sports Commander Gaming Set
Other	None	None	None	None	None
PCMark 8 2.0 Home score	5434	5332	5327	5316	4575
Alien vs Predator score (720p/1080p)	172.6/90.1fps	173.4/90.7fps	169.7/89.8fps	169.6/89.6fps	170.3/88.8fps
Final Fantasy XIV (Maximum)	133.2fps	134.6fps	132.8fps	130.4fps	128.3fps
Sniper Elite V2 (Low/Medium/Ultra)	461.4/208.5/49fps	459.6/201.8/49.2fps	447.3/205.9/49fps	444.7/203.2/47.6fps	356.4/203.9/47.7fps
Power Consumption	5/295W	55/303W	Not tested	63/251W	51/264W
Warranty	2 years parts, 3 years labour	5 years: first 2 years C&R + labour, remaining 3 labour	Vibox Evolution Lifetime Warranty	Lifetime labour, 2 years parts, 1-year C&R	3-year RTB (1-year parts only), 30-day C&R
FULL REVIEW	TINYURL.COM/NBC7YNC	TINYURL.COM/OK4Z5QO	TINYURL.COM/KKKRXAD	TINYURL.COM/PULQUJ2	TINYURL.COM/P9CVRNQ

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All-in-one PCs	1  PC ADVISOR RECOMMENDED	2 	3 	4 	5 
	Apple iMac with 5K display	Acer Aspire AZ3-615	Chillblast Volante A10	Asus Eee Top	HP Envy Beats 23-n001na
Price	£1,999 inc VAT	£799 inc VAT	£1,299 inc VAT	£799 inc VAT	£900 inc VAT
Website	Apple.com/uk	Acer.co.uk	Chillblast.com	Asus.com/uk	Hp.com/uk
Build rating	★★★★★★	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Features rating	★★★★★★	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Performance rating	★★★★☆	★★★★☆	★★★★★	★★★★☆	★★★★☆
Value rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Overall rating	★★★★★	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Processor	3.9GHz Intel Core i5-4690	2.7GHz Intel Core i5-4460T	4GHz Intel Core i7-4790S	2.6GHz Intel Core i5-4200U	3.2GHz Intel Core i7-4785T
RAM	8GB DDR3	8GB DDR3	16GB DDR3	6GB DDR3	8GB DDR3
Storage	1TB Fusion Drive	1TB HDD	1TB SSD	1TB HDD	1TB HDD
Screen	27in	23in touchscreen	24in	23in touchscreen	23in touchscreen
Screen resolution	5120x2880	1920x1080	1920x1080	1920x1080	1920x1080
Graphics card	AMD Radeon M9 M290X	nVidia GeForce GT 840M	nVidia GeForce GT 750M	Intel HD Graphics 4400	Intel HD Graphics 4600
Video memory	2GB	2GB	2GB	N/A	N/A
Wireless	802.11b/g/n	802.11b/g/n	802.11b/g/n	802.11b/g/n	802.11b/g/n
Ethernet	Gigabit	Gigabit	Gigabit	Gigabit	Gigabit
Bluetooth	x	x	x	x	x
USB	4x USB 3.0	2x USB 3.0, 3x USB 2.0	4x USB 3.0, 2x USB 2.0	3x USB 3.0, 3x USB 2.0	2x USB 3.0, 4x USB 2.0
FireWire	x	x	x	x	x
Thunderbolt	✓	x	x	x	x
HDMI	x	x	✓	✓	✓
Media card slot	✓	✓	✓	✓	✓
Optical drive	None	DVD Writer	Blu-Ray Combo	DVD Writer	DVD Writer
Other	Final Cut Pro X, Logic Pro X, Aperture	1Mp webcam, wireless keyboard and mouse	Logitech MK520 wireless keyboard and mouse	2Mp webcam, Freeview TV, wireless keyboard and mouse	Wireless keyboard and mouse, Beats Audio stereo speaker system (8x 12W)
Operating system	OS X Yosemite	Windows 8.1 64-bit	Windows 8.1 64-bit	Windows 8.1 64-bit	Windows 8.1 64-bit
Power consumption (idle/max)	46/215W	46/91W	35/177W	33/69W	43/81W
Sniper V2 Elite (Low/High/Ultra)	Not tested	47.7/18.7/5.1fps	91.5/41.2/10.5fps	31.4/7.8/5fps	27.7/7.4/5fps
PCMark 8 Home score	Not tested	2906	3776	2828	2702
Dimensions	650x203x516mm	540x489x579mm	585x200x450mm	571x359x50-214mm	563x143x413mm
Weight	9.54kg	8.8kg	14.6kg	9kg	8.4kg
Warranty	1-year return-to-base	Not specified	5-year labour (2-year collect-and-return)	1-year return-to-base	1-year limited parts, labour, and pickup-and-return service
FULL REVIEW	TINYURL.COM/NWJUJSF	TINYURL.COM/QEY8FOE	TINYURL.COM/LO8A5MC	TINYURL.COM/PRPHC7L	TINYURL.COM/O6M4BCN

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Best smartphones	1	2	3	4	5
	 PC ADVISOR RECOMMENDED				
	Samsung Galaxy S6	Google Nexus 6P	Apple iPhone 6s Plus	Samsung Galaxy Note5	Apple iPhone 6s
Price	£349 inc VAT	£449 inc VAT	£619 inc VAT	£600 inc VAT	£539 inc VAT
Website	Samsung.com/uk	Google.co.uk	Apple.com/uk	Samsung.com/uk	Apple.com/uk
Build rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Features rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Performance rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Value rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
OS (out of box)	Android 5.0 Lollipop	Android 6.0 Marshmallow	iOS 9	Android 5.1.1 Lollipop	iOS 9
Processor	2.1GHz Exynos 7420	Qualcomm Snapdragon 810	A9	2.1GHz Exynos 7420	A9
RAM	3GB	3GB	2GB	4GB	2GB
Storage	32/64GB	32/64/128GB	16/64/128GB	32/64GB	16/64/128GB
MicroSD support	x	x	x	x	x
Graphics	Mali-T760 GPU	Adreno 430	M9	Mali-T760MP8	M9
Screen size	5.1in	5.7in	5.5in	5.7in	4.7in
Screen resolution	1440x2560	2560x1440	1920x1080	720x1280	1334x750
Pixel density	577ppi	518ppi	401ppi	518ppi	326ppi
Screen technology	Super AMOLED	Quad HD capacitive	IPS	Super AMOLED	IPS
Front camera	5Mp	8Mp	5Mp	5Mp	5Mp
Rear camera	16Mp, LED flash	12.3Mp, LED flash	12Mp, LED flash	16Mp, LED flash	12Mp, LED flash
Video recording	4K	4K	4K	4K	4K
Cellular connectivity	4G	4G	4G	4G	4G
SIM type	Nano-SIM	Nano-SIM	Nano-SIM	Nano-SIM	Nano-SIM
Dual-SIM as standard	x	x	x	x	x
Wi-Fi	802.11a/b/g/n/ac, dual-band	802.11a/b/g/n/ac, dual-band	802.11a/b/g/n/ac, dual-band	802.11a/b/g/n/ac, dual-band	802.11a/b/g/n/ac, dual-band
Bluetooth	Bluetooth 4.1	Bluetooth 4.2	Bluetooth 4.2	Bluetooth 4.2	Bluetooth 4.2
GPS	GPS, Glonass	A-GPS, Glonass	A-GPS, Glonass	A-GPS, Glonass	A-GPS, Glonass
NFC	✓	✓	✓	✓	✓
USB OTG	✓	✓	✓	✓	✓
Extra features	Heart-rate sensor, fingerprint scanner	Fingerprint scanner	Fingerprint scanner	Heart-rate sensor, fingerprint scanner	Fingerprint scanner
Geekbench 3.0 (single)	1347	Not tested	2527	1497	2511
Geekbench 3.0 (multi)	4438	3939	4407	Not tested	4404
SunSpider	1048ms	636ms	210ms	718ms	224.4ms
GFXBench: T-Rex	30fps	34fps	59fps	37fps	60fps
GFXBench: Manhattan	14fps	14fps	38fps	15fps	52fps
Battery	2550mAh, non-removable	3450mAh, non-removable	Lithium-ion	2300mAh, non-removable	Lithium-ion
Dimensions	143.4x70.5x6.8mm	159.3x77.8x7.3mm	158.2x77.9x7.3mm	153.2x76.1x7.6mm	138.3x67.1x7.1mm
Weight	138g	178g	192g	171g	143g
Warranty	1 year	1 year	1 year	1 year	1 year
FULL REVIEW	TINYURL.COM/PC2KOYQ	TINYURL.COM/NABSV4E	TINYURL.COM/OYRA5MX	TINYURL.COM/OCQAJPL	TINYURL.COM/ZU5TPCE

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Best budget smartphones						
		1	2	3	4	5
		Vodafone Smart Ultra 6	Motorola Moto E 4G 2015	Vodafone Smart Prime 6	Wileyfox Swift	Xiaomi Redmi Note 3
Price		£125 inc VAT	£109 inc VAT	£79 inc VAT	£129 inc VAT	£118 inc VAT
Website		Vodafone.co.uk	Motorola.co.uk	Vodafone.co.uk	Wileyfox.com	Xiaomi-mi.com
Build rating		★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Features rating		★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Performance rating		★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Value rating		★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Overall rating		★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
OS (out of box)		Android 5.0.2 Lollipop	Android 5.0 Lollipop	Android 5.0.2 Lollipop	Cyanogen OS	Android 5.0 Lollipop
Processor		2.5GHz Snapdragon 615	1.2GHz Snapdragon 410	1.2GHz Snapdragon 410	1.2GHz Snapdragon 410	2GHz MediaTek MT6795
RAM		2GB	1GB	1GB	2GB	2GB
Storage		16GB	8GB	8GB	16GB	16GB
MicroSD support		Up to 128GB	Up to 32GB	Up to 64GB	Up to 32GB	No
Graphics		Adreno 405	Adreno 306	Adreno 306	Adreno 306	Not specified
Screen size		5.5in	4.5in	5in	5in	5.5in
Screen resolution		1920x1080	540x960	720x1280	1280x720	1920x1080
Pixel density		401ppi	245ppi	294ppi	294ppi	403ppi
Screen technology		IPS	IPS	IPS	IPS	Full HD
Front camera		5Mp	0.3Mp	2Mp	5Mp	5Mp
Rear camera		13Mp	5Mp	8Mp	13Mp, LED flash	13Mp, LED flash
Video recording		1080p	720p	1080p	1080p	Not specified
Cellular connectivity		4G*	4G	4G*	4G	4G
SIM type		Nano-SIM	Micro-SIM	Micro-SIM	Micro-SIM	Micro-SIM
Dual-SIM as standard		x	x	x	x	✓
Wi-Fi		802.11b/g/n	802.11b/g/n	802.11b/g/n	802.11b/g/n	802.11ac
Bluetooth		Bluetooth 4.0	Bluetooth 4.0	Bluetooth 4.0	Bluetooth 4.0	Bluetooth 4.0
GPS		GPS, A-GPS	GPS, A-GPS, Glonass	A-GPS	A-GPS	GPS, A-GPS, Glonass
NFC		✓	x	x	x	✓
USB OTG		x	x	✓	✓	x
Extra features		FM radio	Double-twist launches camera, lockscreen alerts	FM radio	3D G-Sensor,	Fingerprint scanner
Geekbench 3.0 (single)		649	464	464	Not tested	Not tested
Geekbench 3.0 (multi)		2469	1463	1401	1456	4597
SunSpider		1545ms	1301ms	1301ms	1760ms	907ms
GFXBench: T-Rex		14fps	13fps	9.4fps	10fps	122fps
GFXBench: Manhattan		5.7fps	6fps	3.8fps	4fps	8fps
Battery		3000mAh, non-removable	2390mAh, non-removable	Not specified	2500mAh, removable	4000mAh, non-removable
Dimensions		154x77x9mm	66.8x5.2-12.3x129.9mm	141.65x71.89x9mm	141x71x9.4mm	150x76x8.65mm
Weight		159g	145g	155g	135g	164g
Warranty		1 year	1 year	1 year	1 year	1 year
FULL REVIEW		TINYURL.COM/Q7Q9NXR	TINYURL.COM/Q7Q9NXR	TINYURL.COM/Q5DSNHE	TINYURL.COM/PO9KG38	TINYURL.COM/JQNP2RB

* Locked to Vodafone. All other models here are unlocked

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Best phablets	    				
	Google Nexus 6P	Samsung Galaxy Note5	Apple iPhone 6s Plus	Samsung Galaxy Note 4	LG G4
Price	£449 inc VAT	£600 inc VAT	£619 inc VAT	£599 inc VAT	£500 inc VAT
Website	Google.co.uk	Samsung.com/uk	Apple.com/uk	Samsung.com/uk	Lg.com/uk
Build rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Features rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Performance rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Value rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
OS (out of box)	Android 6.0 Marshmallow	Android 5.1.1 Lollipop	iOS 9	Android 4.4 KitKat	Android 5.1 Lollipop
Processor	Qualcomm Snapdragon 810	2.1GHz Exynos 7420	A9	2.7GHz Snapdragon 805	1.82GHz Snapdragon 808
RAM	3GB	4GB	2GB	3GB	3GB
Storage	32/64/128GB	32/64GB	16/64/128GB	32GB	32GB
MicroSD support	x	x	x	Up to 128GB	Up to 128GB
Graphics	Adreno 430	Mali-T760MP8	M9	Adreno 420	Adreno 418
Screen size	5.7in	5.7in	5.5in	5.7in	5.5in
Screen resolution	2560x1440	720x1280	1920x1080	1440x2560	1440x2560
Pixel density	518ppi	518ppi	401ppi	515ppi	538ppi
Screen technology	Quad HD capacitive	Super AMOLED	IPS	Super AMOLED	IPS
Front camera	8Mp	5Mp	5Mp	3.7Mp	8Mp
Rear camera	12.3Mp, LED flash	16Mp, LED flash	12Mp, LED flash	16Mp, LED flash	16Mp, LED flash
Video recording	4K	4K	4K	4K	4K
Cellular connectivity	4G	4G	4G	4G	4G
SIM type	Nano-SIM	Nano-SIM	Nano-SIM	Micro-SIM	Micro-SIM
Dual-SIM as standard	x	x	x	x	x
Wi-Fi	802.11a/b/g/n/ac, dual-band	802.11a/b/g/n/ac, dual-band	802.11a/b/g/n/ac, dual-band	802.11a/b/g/n/ac, dual-band	802.11a/b/g/n/ac, dual-band
Bluetooth	Bluetooth 4.2	Bluetooth 4.2	Bluetooth 4.2	Bluetooth 4.1	Bluetooth 4.0
GPS	A-GPS, Glonass	A-GPS, Glonass	A-GPS, Glonass	GPS, Glonass	A-GPS, Glonass
NFC	✓	✓	✓	✓	✓
USB OTG	✓	✓	✓	✓	✓
Extra features	Fingerprint scanner	Heart-rate sensor, fingerprint scanner	Fingerprint scanner	Fingerprint, UV, heart-rate sensors, S Pen stylus	24bit/192kHz audio, rear key, IR blaster
Geekbench 3.0 (single)	Not tested	1497	2527	Not tested	Not tested
Geekbench 3.0 (multi)	3939	Not tested	4407	3272	3513
SunSpider	636ms	718ms	210ms	1367ms	715ms
GFXBench: T-Rex	34fps	37fps	59fps	27fps	25fps
GFXBench: Manhattan	14fps	15fps	38fps	11fps	9fps
Battery	3450mAh, non-removable	2300mAh, non-removable	Lithium-ion	3220mAh, removable	3000mAh, removable, Qi
Dimensions	159.3x77.8x7.3mm	153.2x76.1x7.6mm	158.2x77.9x7.3mm	78.6x153.5x8.5mm	76x149x6.3-9.8mm
Weight	178g	171g	192g	176g	155g
Warranty	1 year	1 year	1 year	2 years	1 year
FULL REVIEW	TINYURL.COM/NABSV4E	TINYURL.COM/OCQAJPL	TINYURL.COM/OYRA5MX	TINYURL.COM/PNHJCZ4	TINYURL.COM/QDGU48T






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Best 7- & 8in tablets	1	2	3	4	5
	Samsung Galaxy Tab S2 8	Apple iPad mini 4	Samsung Galaxy Tab S 8.4	Sony Xperia Z3 Tablet Compact	Apple iPad mini 2
Price	£319 inc VAT	£319 inc VAT	£319 inc VAT	£299 inc VAT	£219 inc VAT
Website	Samsung.com/uk	Apple.com/uk	Samsung.com/uk	Sony.co.uk	Apple.com/uk
Build rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Features rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Performance rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Value rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
OS (out of box)	Android 5.0 Lollipop	iOS 9	Android 4.4 KitKat	Android 4.4 KitKat	iOS 9
Processor	1.9GHz Exynos 5433	Apple A8, Apple M8	Exynos 5420, octa-core	2.5GHz Snapdragon 801	Apple A7, Apple M7
RAM	3GB	2GB	3GB	3GB	1GB
Storage	32GB/64GB	16GB/64/128GB	16GB/32GB	16GB/32GB	16GB/32GB
MicroSD support	Up to 128GB	×	Up to 128GB	Up to 128GB	×
Graphics	Not specified	Apple A8	ARM Mali-T628 MP6	Adreno 330	Apple A7
Screen size	8in	7.9in	8.4in	8in	7.9in
Screen resolution	2048x1536	2048x1536	2560x1440	1920x1200	2048x1536
Pixel density	320ppi	326ppi	359ppi	283ppi	326ppi
Screen technology	Super AMOLED	IPS	Super AMOLED	IPS	IPS
Front camera	2.1Mp	1.2Mp	2.1Mp	2.2Mp	1.2Mp
Rear camera	8Mp	8Mp	8Mp, LED flash	8.1Mp	5Mp
Video recording	QHD	1080p	1080p	1080p	7200p
Cellular connectivity	4G version available	4G version available	4G version available	4G version available	4G version available
Wi-Fi	802.11a/b/g/n/ac	802.11a/b/g/n/ac, dual-band	802.11a/b/g/n/ac, dual-band	802.11a/b/g/n/ac, dual-band	802.11a/b/g/n, dual-band
Bluetooth	Bluetooth 4.1	Bluetooth 4.2	Bluetooth 4.0	Bluetooth 4.0	Bluetooth 4.0
GPS	A-GPS, Glonass	A-GPS, Glonass	GPS, Glonass	A-GPS, Glonass	A-GPS, Glonass
NFC	×	×	×	✓	×
USB OTG	✓	×	✓	✓	×
Fingerprint scanner	×	✓	✓	×	×
Waterproof	×	×	×	✓	×
Extra features	None	None	Stereo speakers	PS4 Remote Play, stereo speakers	None
Geekbench 3.0 (single)	Not tested	1719	Not tested	Not tested	Not tested
Geekbench 3.0 (multi)	4305	3101	2765	2708	Not tested
SunSpider	Not tested	Not tested	1089ms	1017ms	397ms
GFXBench: T-Rex	26fps	52fps	14fps	28fps	Not tested
GFXBench: Manhattan	11fps	25fps	3fps	11fps	Not tested
Battery	4000mAh, non-removable, Qi	5124mAh, non-removable	4900mAh, non-removable	4500mAh, non-removable	6470mAh, non-removable
Dimensions	198.6x134.8x5.6mm	203.2x134.8x6.1mm	126x213x6.6mm	213x124x6.4mm	200x134.7x7.5mm
Weight	265g	304g	294g	270g	331g
Warranty	1 year	1 year	1 year	1 year	1 year
FULL REVIEW	TINYURL.COM/P37QFDW	TINYURL.COM/PBMONMA	TINYURL.COM/OUEM64Z	TINYURL.COM/NJ6VHEO	TINYURL.COM/PCJPB5L

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Best 9- & 10in tablets	 1 PC ADVISOR GOLD	 2	 3	 4	 5 PC ADVISOR RECOMMENDED
	Apple iPad Air 2	Sony Xperia Z4 Tablet	Microsoft Surface Pro 4	Apple iPad Pro	Apple iPad Air
Price	£399 inc VAT	£499 inc VAT	£749 inc VAT	£679 inc VAT	£319 inc VAT
Website	Apple.com/uk	Sony.co.uk	Microsoft.com/en-gb	Apple.com/uk	Apple.com/uk
Build rating	★★★★★★	★★★★★☆	★★★★★☆	★★★★★☆	★★★★★☆
Features rating	★★★★★☆	★★★★★☆	★★★★★☆	★★★★★☆	★★★★★☆
Performance rating	★★★★★☆	★★★★★☆	★★★★★☆	★★★★★☆	★★★★★☆
Value rating	★★★★★☆	★★★★★☆	★★★★★☆☆	★★★★★☆☆	★★★★★☆☆
Overall rating	★★★★★☆☆	★★★★★☆☆	★★★★★☆☆	★★★★★☆☆	★★★★★☆☆
OS (out of box)	iOS 9	Android 5.0 Lollipop	Windows 10 Pro	iOS 9	iOS 9
Processor	Apple A8X, Apple M8	Snapdragon 810	Intel Core m3	Apple A9X, Apple M9	Apple A7, Apple M7
RAM	2GB	3GB	4GB	4GB	1GB
Storage	16/64/128GB	32GB	128GB SSD	16GB/32GB	16GB/32GB
MicroSD support	×	Up to 128GB	×	×	×
Graphics	Apple A8X	Adreno 430	Intel HD Graphics 515	Apple M9	Apple A7
Screen size	9.7in	10.1in	12.3in	12.9in	9.7in
Screen resolution	2048x1536	2560x1600	2736x1824	2048x2732	2048x1536
Pixel density	264ppi	299ppi	None	264ppi	264ppi
Screen technology	IPS	IPS	PixelSense	IPS	IPS
Front camera	1.2Mp	5.1Mp	5Mp	1.2Mp	1.2Mp
Rear camera	8Mp	8.1Mp	8Mp	8Mp	5Mp
Video recording	1080p	1080p	Not specified	1080p	1080p
Cellular connectivity	4G version available	4G version available	×	4G version available	4G version available
Wi-Fi	802.11a/b/g/n/ac, dual-band	802.11a/b/g/n/ac, dual-band	802.11a/b/g/n	802.11a/b/g/n/ac, dual-band	802.11a/b/g/n, dual-band
Bluetooth	Bluetooth 4.0	Bluetooth 4.1	Bluetooth 4.1	Bluetooth 4.0	Bluetooth 4.0
GPS	A-GPS, Glonass	A-GPS, Glonass	×	A-GPS, Glonass	A-GPS, Glonass
NFC	✓ (for Apple Pay)	✓	×	✓ (for Apple Pay)	×
USB OTG	×	✓	✓	×	×
Fingerprint scanner	✓	×	×	✓	×
Waterproof	×	×	×	×	×
Extra features	None	None	None	None	None
Geekbench 3.0 (single)	1816	Not tested	Not tested	Not tested	1487
Geekbench 3.0 (multi)	4523	4573	6721	5498	2703
SunSpider	Not tested	580ms	Not tested	Not tested	400ms
GFXBench: T-Rex	48fps	37fps	47fps	59fps	23fps
GFXBench: Manhattan	Not tested	16fps	22fps	34fps	Not tested
Battery	7340mAh, non-removable	6000mAh, non-removable	Not specified	10,307mAh, non-removable	8600mAh, non-removable
Dimensions	240x169.5x6.1mm	254x167x6.1mm	292x201x8.45mm	305.7x220.6x6.9mm	240x169x7.5mm
Weight	437g	393g	766g	713g	469g
Warranty	1 year	1 year	1-year return-to-base	1 year	1 year
FULL REVIEW	TINYURL.COM/PLQXWSZ	TINYURL.COM/JG34GZP	TINYURL.COM/HE9UYXU	TINYURL.COM/HFFVJR9	TINYURL.COM/NVOOF6H






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Best smartwatches	1  PC ADVISOR RECOMMENDED	2 	3 	4  PC ADVISOR RECOMMENDED	5  PC ADVISOR RECOMMENDED
	LG G Watch R	Huawei Watch	Motorola Moto 360 2	Motorola Moto 360	Sony Smartwatch 3
Price	£195 inc VAT	£289 inc VAT	£229 inc VAT	£199 inc VAT	£189 inc VAT
Website	Lg.com/uk	Consumer.huawei.com/en	Motorola.co.uk	Motorola.co.uk	Sony.co.uk
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Operating system	Android Wear	Android Wear	Android Wear	Android Wear	Android Wear
Compatibility	Android	Android	Android, iOS	Android	Android
Display	1.3in 320x320 P-OLED	1.4in 400x400 AMOLED	1.37in 360x325 LCD	1.56in 290x320 LCD	1.6in 320x320 LCD
Processor	1.2GHz Snapdragon 400	Snapdragon 400	Snapdragon 400	TI OMAP 3	1.2GHz ARM V7
RAM	512MB	512MB	512MB	512MB	512MB
Storage	4GB	4GB	4GB	4GB	4GB
Waterproof	Yes	Yes	Yes	Yes	Yes
Battery	410mAh	300mAh	300mAh	320mAh	420mAh
Dimensions	46.4x53.6x9.7mm	42x11.3mm	42x11.4mm	46x11.5mm	36x51x10mm
Weight	62g	40g	53.6g	49g (leather band model)	45g
Warranty	1 year	1 year	1 year	1 year	1 year
FULL REVIEW	TINYURL.COM/QATY8FT	TINYURL.COM/PXV9PVX	TINYURL.COM/GUJR9XX	TINYURL.COM/O9C69K6	TINYURL.COM/OQVZ3PN





Best smartwatches	6 	7 	8 	9 	10  PC ADVISOR RECOMMENDED
	LG Watch Urbane	Microsoft Band 2	Asus ZenWatch	Apple Watch	Pebble Steel
Price	£259 inc VAT	£199 inc VAT	£199 inc VAT	£299 inc VAT	£179 inc VAT
Website	Lg.com/uk	Microsoft.com/en-gb	Uk.asus.com	Apple.com/uk	Getpebble.com
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Operating system	Android Wear	Windows 10 based	Android Wear	watchOS	Proprietary
Compatibility	Android	iOS, Android, Windows	Android	iOS	iOS, Android
Display	1.3in 320x320 P-OLED	32x12.8mm 320x128 AMOLED	1.6in 320x320 AMOLED	1.32in 340x312 Ion-X Glass	1.26in 144x168 E-Paper
Processor	1.2GHz Snapdragon 400	Not specified	1.2GHz Snapdragon 400	Apple S1	Not specified
RAM	512MB	Not specified	512MB	512MB	512MB
Storage	4GB	Not specified	4GB	8GB	Not specified
Waterproof	Yes	Yes	Yes	Yes	Yes
Battery	410mAh	Not specified	1.4Wh	Not specified	130mAh
Dimensions	46x52x10.9mm	Small, medium, large sizes	51x39.9x7.9-9.4mm	38.6x33.3x10.5mm	46x34x10.5mm
Weight	67g	59g (medium)	75g	72g	156g
Warranty	1 year	1 year	1 year	1 year	1 year
FULL REVIEW	TINYURL.COM/Q3VK7ES	TINYURL.COM/HHP4LMR	TINYURL.COM/NN7GA7W	TINYURL.COM/OUTH9XK	TINYURL.COM/PPBXV7J






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Best activity trackers	    				
	1	2	3	4	5
	Fitbit Charge HR	Fitbit Surge	Fitbit One	Microsoft Band 2	Fitbit Charge
Price	£119 inc VAT	£199 inc VAT	£79 inc VAT	£199 inc VAT	£99 inc VAT
Website	Fitbit.com/uk	Fitbit.com/uk	Fitbit.com/uk	Microsoft.com/en-gb	Fitbit.com/uk
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Compatibility	iOS, Android, Windows	iOS, Android, Windows	iOS, Android	iOS, Android, Windows	iOS, Android, Windows
Display	OLED	Touchscreen	OLED	AMOLED	OLED
Pedometer	Yes	Yes	Yes	Yes	Yes
Heart-rate monitor	Yes	Yes	No	Yes	No
Sleep tracking	Yes	Yes	Yes	Yes	Yes
Alarm	Yes	Yes	Yes	Yes	Yes
Third-party app syncing	Yes	Yes	Yes	Yes	Yes
Call notifications	Yes	Yes	No	Yes	Yes
Waterproof	Yes	Yes	No	Yes	Yes
Battery life	5+ days	5 days	10-14 days	2 days	7-10 days
Dimensions, weight	21.1mm, 26g	34mm, 51g	35.5x28x9.65mm, 8g	Small, medium (59g), large	21.1mm, 24g
FULL REVIEW	TINYURL.COM/PCKV4SU	TINYURL.COM/O83DR47	TINYURL.COM/PT2TC6F	TINYURL.COM/HHP4LMR	TINYURL.COM/PFMQ9KH






Best activity trackers	    				
	6	7	8	9	10
	Basis Peak	Xiaomi Mi Band 1S Pulse	Xiaomi Mi Band	Honor Band Zero	Jawbone Up 2
Price	£169 inc VAT	£22 inc VAT	£29 inc VAT	£45 inc VAT	£89 inc VAT
Website	En-gb.mybasis.com	Mi.com/en	Mi.com/en	Gearbest.com	Jawbone.com
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Compatibility	iOS, Android	iOS, Android	iOS, Android	iOS, Android	iOS, Android
Display	E-Ink	No	No	PMOLED	No
Pedometer	Yes	No	Yes	No	Yes
Heart-rate monitor	Yes	Yes	No	No	No
Sleep tracking	Yes	Yes	Yes	Yes	Yes
Alarm	No	Yes	Yes	Yes	Yes
Third-party app syncing	No	No	No	No	Yes
Call notifications	Yes	Yes	Yes	No	No
Waterproof	Yes	Yes	Yes	Yes	Splashproof
Battery life	4 days	30 days	30 days	2 days	7 days
Dimensions, weight	33x43x10mm, 51g	37x13.6x9.9mm, 14.5g	157-205mm, 13g	244.4x38x9.5mm, 25g	220x11.5x3-8.5mm, 25g
FULL REVIEW	TINYURL.COM/LHMQ2AC	TINYURL.COM/QZ3YVCR	TINYURL.COM/QZ3YVCR	TINYURL.COM/GSTXOR9	TINYURL.COM/ND8YMB8






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Best budget printers	    				
	1	2	3	4	5 PC ADVISOR GOLD
	HP OfficeJet 3830	Samsung Xpress M2022W	Brother HL-1110	Canon Pixma MX535	Canon i-Sensys LBP6230dw
Price	£60 inc VAT	£79 inc VAT	£59 inc VAT	£70 inc VAT	£91 inc VAT
Website	Hp.com/uk	Samsung.com/uk	Brother.co.uk	Canon.co.uk	Canon.co.uk
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Technology	Colour inkjet	Mono laser	Mono laser	Colour inkjet	Mono laser
Max print resolution	1200x1200dpi	1200x1200dpi	600x600dpi	4800x1200dpi	1200x1200dpi
Actual print speed	B=11ppm C=4ppm	B=20ppm	B=16.4ppm	B=9.7ppm C=3.8ppm	B=22.2ppm
Scan/fax facilities	None	1200x1200 scans	None	1200x2400 scans/fax	None
Supported interfaces	USB 2.0, 802.11b/g/n, AirPrint	USB 2.0, 802.11b/g/n	USB 2.0	USB 2.0, 802.11b/g/n, AirPrint	USB 2.0, 802.11b/g/n
Cost per page	B=6p C=7p	B=2p	B=2.7p	B=2.7p C=4.8p	B=2p
Media card/auto duplex	x✓	xx	xx	x✓	x✓
Input capacity	60 sheets	150 sheets	150 sheets	100 sheets + 30-sheet ADF	250 sheets
Dimensions	222x454x362mm	332x215x178mm	340x238x189mm	458x385x200mm	379x293x243mm
Weight	5.8kg	4kg	4.5kg	8.5kg	7kg
Warranty	1 year	1 year	1 year	1 year	1 year
FULL REVIEW	TINYURL.COM/PJ4K9D7	TINYURL.COM/PQ9JUDN	TINYURL.COM/OQE9LGJ	TINYURL.COM/N9LXVW7	TINYURL.COM/KZW8VU3






Best printers	    				
	1 PC ADVISOR RECOMMENDED	2	3	4 PC ADVISOR GOLD	5
	Canon Pixma MG7550	Samsung Xpress M2835DW	Canon i-Sensys MF6180dw	Epson WorkForce Pro	Brother HL-L9200CDWT
Price	£130 inc VAT	£143 inc VAT	£320 inc VAT	£200 inc VAT	£548 inc VAT
Website	Canon.co.uk	Samsung.com/uk	Canon.co.uk	Epson.co.uk	Brother.co.uk
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Technology	Colour inkjet	Mono laser	Mono laser	Colour inkjet	Colour laser
Max print resolution	9600x2400dpi	4800x600dpi	1200x600dpi	4800x1200dpi	2400x600dpi
Actual print speed	B=14.3ppm	B=22.7ppm	B=24ppm	B=18.9ppm	B=30ppm C=30ppm
Scan/fax facilities	2400x4800dpi scanner	None	600dpi scanner, 33.6Kb/s fax	None	None
Supported interfaces	USB 2.0, ethernet, 802.11b/g/n	USB 2.0, ethernet, 802.11b/g/n	USB 2.0, ethernet, 802.11b/g/n	USB 2.0, ethernet, 802.11b/g/n	USB 2.0, ethernet, 802.11b/g/n
Cost per page	B=2.4p C=8.1p	B=1.5p	B=1.5p	B=1.1p	B=1p C=5.9p
Media card/auto duplex	x✓	x✓	x✓	x✓	x✓
Input capacity	125 sheets	250 sheets	250 + 50 sheet + 50 ADF	250 + 80 sheet	750 sheets + 50 sheet
Dimensions	435x370x148mm	368x335x202mm	390x473x431mm	3461x442x284mm	410x495x445mm
Weight	7.9kg	7.4kg	19.1kg	11.4kg	28.3kg
Warranty	1 year	1 year	1 year	1 year	1 year
FULL REVIEW	TINYURL.COM/PZ3SVH7	TINYURL.COM/QECOF7V	TINYURL.COM/LE9WA5N	TINYURL.COM/OC7FUJ3	TINYURL.COM/PT52MH6


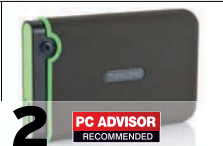


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Best wireless routers	    				
	1	2	3	4	5
	Apple AirPort Extreme	Netgear Nighthawk R7000	TP-Link Archer VR900	AVM Fritz!Box 3490	Asus DSL-AC68U
Price	£169 inc VAT	£150 inc VAT	£139 inc VAT	£135 inc VAT	£129 inc VAT
Website	Apple.com/uk	Netgear.co.uk	Tp-link.com	En.avm.de	UK.asus.com
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Standards supported	802.11a/b/g/n/ac	802.11a/b/g/n/ac	802.11a/b/g/n/ac	802.11a/b/g/n/ac	802.11a/b/g/n/ac
Frequency modes	2.4GHz/5GHz (concurrent)	2.4GHz/5GHz (concurrent)	2.4GHz/5GHz (concurrent)	2.4GHz/5GHz (concurrent)	2.4GHz/5GHz (concurrent)
Antennas	6x internal	3x external	3x external	Internal	3x external
Built-in modem	×	×	✓	×	✓
Manufacturer's rating	1300/450Mb/s	1300/600Mb/s	1300/600Mb/s	1300/450Mb/s	1300/600Mb/s
WPS	×	✓	✓	✓	✓
Ports	Gigabit WAN, 3x gigabit LAN, USB	Gigabit WAN, 1x USB 3.0, 1x USB 2.0	Gigabit WAN, 1x USB 3.0, 1x USB 2.0	ADSL, 4x gigabit LAN, 2x USB 3.0	1x USB 3.0, 4 x RJ45, 1x RJ11
Average power use	8W	9W	N/S	8W	N/S
Max speed (11n/11ac)	171/572Mb/s	171/592Mb/s	146/622Mb/s	114/563Mb/s	114/565.3Mb/s
Dimensions, weight	98x168x98mm, 945g	285x186x45mm, 750g	245x181x90mm, 720g	190x120x60mm/Not specified	220x160x83.3mm, 640g
Warranty	1 year	Not specified	Not specified	Not specified	Not specified
FULL REVIEW	TINYURL.COM/MFDLLSC	TINYURL.COM/Q2NRQ8Q	TINYURL.COM/OF8KYPC	TINYURL.COM/OF8KYPC	TINYURL.COM/PGHOUFQ

Best powerline adaptors	    				
	1	2	3	4	5
	Solwise SmartLink 1200AV2	TrendNet Powerline 500 AV2	TP-Link AV1200	Devolto dLan 1200+	Devolto dLAN 500AV
Price	£43 inc VAT	£41 inc VAT	£88 inc VAT	£119 inc VAT	£129 inc VAT
Website	Solwise.com	Trendnet.com	Uk.tp-link.com	Devolto.com/uk	Devolto.com/uk
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
No of adaptors in kit	1 (2 required)	2	2	2	2
Max throughput	1200Mb/s	600Mb/s	1200Mb/s	1200Mb/s	500Mb/s
Near test result	410Mb/s	146Mb/s	500Mb/s	357Mb/s	96Mb/s
Far test result	107Mb/s	71Mb/s	200Mb/s	126Mb/s	47Mb/s
Ethernet ports	2x gigabit	1x gigabit	1x gigabit	1x gigabit	3x gigabit
Passthrough socket	Yes	No	Yes	Yes	Yes
Wireless hotspot	No	No	No	No	Yes
Encryption	128-bit	128-bit	128-bit	128-bit	128-bit
Dimensions	62x122x41mm	55x87x58mm	230x190x100mm	130x66x42mm	152x76x40mm
Weight	Not specified	90g	898g	Not specified	Not specified
Warranty	2 years	3 years	1 year	3 years	3 years
FULL REVIEW	TINYURL.COM/NZ4EJW8	TINYURL.COM/QYEPJQ7	TINYURL.COM/NVONCWT	TINYURL.COM/Q4EO04M	TINYURL.COM/OVNPPQ7



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Best NAS drives	    				
	Synology DS115j	Qnap HS-210	WD My Cloud EX2100	Synology DS216play	Synology DS414j
Price	£83 inc VAT (diskless)	£190 inc VAT (diskless)	£205 inc VAT (diskless)	£190 inc VAT (diskless)	£270 inc VAT (diskless)
Website	Synology.com	Qnap.com	Wd.com	Synology.com	Synology.com
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Drive bays	1	2	2	2	4
Processor	800MHz Marvell Armada 370	1.6GHz Marvell single-core	1.3GHz Marvel Armada 385	1.5GHz STM STiH412	1.2GHz Mindspeed Concerto
Memory	256MB DDR3	512MB DDR3	1GB DDR3	1GB DDR3	512MB DDR3
Remote access	✓	✓	✓	✓	✓
eSATA	x	x	x	x	1x
USB port	2x USB 2.0	2x USB 3.0, 2x USB 2.0	2x USB 3.0	2x USB 3.0	1x USB 3.0, 1x USB 2.0
Raid options	None	0/1/JBOD	00/1/JBOD	00/1/JBOD	0/1/5/6/10/JBOD
Software	DSM 5.1	HD Station	My Cloud	DSM 5.2	DSM 5.0
Dimensions	71x161x224mm	302x220x41mm	216x109x148mm	165x100x226mm	184x168x230mm
Weight	700g	1.5kg	3.5kg	1.8kg	2.2kg
Warranty	1 year	2 years	3 years	2 years	3 years
FULL REVIEW	TINYURL.COM/MNEYVNK	TINYURL.COM/OEXRYNY	TINYURL.COM/M643BSG	TINYURL.COM/JTQF67V	TINYURL.COM/M643BSG

Best external hard drives	    				
	Seagate Backup Plus Slim	Transcend StoreJet 25M3	WD My Passport Ultra Metal	Toshiba Canvio Basics	Seagate Seven mm
Price	£74 inc VAT	£70 inc VAT	£90 inc VAT	£76 inc VAT	£99 inc VAT
Website	Seagate.com/gb/en	Uk.transcend-info.com	Wdc.com/en	Toshiba.co.uk	Seagate.com/gb/en
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Capacity tested	2TB	2TB	2TB	2TB	500GB
Capacity range	500GB, 1TB, 2TB	500GB, 1TB, 2TB	1TB, 2TB	500GB, 1TB, 2TB	500GB
Disk size	2.5in	2.5in	2.5in	2.5in	2.5in
Spin speed	N/A	5400rpm	N/A	5400rpm	5400rpm
Transfer speed	142MB/s	135MB/s	114MB/s	117MB/s	49MB/s
Encryption	N/A	256-bit AES	256-bit AES	256-bit AES	N/A
Other interfaces	USB 3.0	USB 3.0	USB 3.0	USB 3.0	USB 3.0
Software	Seagate Dashboard	Transcend Elite	WD Drive Utilities	None	Seagate Dashboard
Dimensions	113.5x76x12.1mm	130x82x19mm	110x80x19mm	111x79x21mm	123x82x7mm
Weight	159g	234g	241g	207g	178g
Warranty	2 years	3 years	3 years	2 years	2 years
FULL REVIEW	TINYURL.COM/OABWL4B	TINYURL.COM/M72D3EP	TINYURL.COM/L2B7V3B	TINYURL.COM/JWHHACB	TINYURL.COM/O6KZFDM

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Best SSDs	    				
	1	2	3	4	5
	OCZ Arc 100	Samsung 850 Pro	SanDisk Extreme Pro	Crucial MX200	Kingston HyperX Savage
Price	£69 inc VAT	£365 inc VAT	£172 inc VAT	£301 inc VAT	£185 inc VAT
Website	Ocz.com	Samsung.com/uk	Sandisk.co.uk	Uk.crucial.com	Kingston.com/en
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Capacity tested	240GB	1TB	480GB	1TB	480GB
Price per GB	28.8p	36.5p	35.8p	30.1p	38.5p
Memory cache	512MB DDR3	1GB LPDDR2	1GB	1GB DDR3	256MB
Controller	Indilinx Barefoot 3 M10	Samsung MCX	Marvell 88SS9187	Marvell 88SS9189	Phison PS3110 S10
Encryption	AES 256-bit	AES 256-bit	AES 256-bit	AES 256-bit	Unknown
Flash	Toshiba 19nm MLC	Samsung 40nm V-AND MLC	SanDisk 19nm MLC	Micron 16nm MLC	Toshiba 19nm A19 MLC
Firmware updated via	OCZ SSD Guru	Samsung SSD Magician	SanDisk SSD Dashboard	Crucial Storage Executive	None
ATTO peak sequential	489-/447MB/s	564-/534MB/s	556-/525MB/s	533-/514MB/s	564-/543MB/s
CDM peak IOPS	79.2-/90.3MB/s	103.2-/93.7MB/s	102.7-/91.4MB/s	26.1-/90.1MB/s	91.6-/94.8MB/s
CDM 4kB rnd	27-/127MB/s	36-/89MB/s	32-/88MB/s	29-/131MB/s	26-59MB/s
Warranty	3 years	10 years	10 years	3 years	3 years
FULL REVIEW	TINYURL.COM/QZQLYY4	TINYURL.COM/OVHDALE	TINYURL.COM/NMSJU25	TINYURL.COM/P3YX2KE	TINYURL.COM/ON54VUC






Smart thermostats	    				
	1	2	3	4	5
	Honeywell EvoHome	Heat Genius	Nest Learning Thermostat	Hive Active Heating	Tado
Price (from)	£249 inc VAT	£249 inc VAT	£179 inc VAT	£179 inc VAT	£199 inc VAT
Website	Honeywelluk.com	Heatgenius.co.uk	Nest.com	Hivehome.com	Tado.com/gb
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Zones controlled	12	6	1	1	1
Hot water control	✓	✓	✗	✓	✓
Underfloor heating	✓	✗	✗	✗	✗
Warranty	18 months	2 years	2 years	1 year	1 year
Verdict	<p>EvoHome is the best smart heating system we've tested. It isn't perfect though, and it's also very expensive, or can be. But if you value convenience and comfort above saving money, it's the one to buy.</p> <p>Heat Genius is very good at a very useful thing. It is easy to use and efficient. How long it takes to pay for itself will depend on your circumstances, and it may be that a full system is too much of a long-term investment for you. If you are looking to install in your a zoned smart heating system, we are happy to recommend Heat Genius.</p> <p>If you need only a single thermostat and don't need control over hot water, the Nest is a good choice. The Nest Protect smoke and carbon monoxide alarm also works with the thermostat, but it's not cheap. There's also the Nest Cam, but the tie-in with the thermostat is minimal.</p> <p>The Hive Active Heating system is a great upgrade for anyone that wants or needs the ability to be able to control their heating remotely. It's by no means the most advanced smart thermostat, but it will do the job at a good price for a lot of people.</p> <p>Tado is the best smart thermostat if you like the idea of presence detection as it simply follows you and your smartphone via GPS, and turns the heating up or down as you get further away or nearer home. There's also hot water control, but the thermostat itself isn't the best looking.</p>				
FULL REVIEW	TINYURL.COM/Q3CXA4Z	TINYURL.COM/Q2TUKL9	TINYURL.COM/N9MWV4G	TINYURL.COM/PDLCSAS	TINYURL.COM/O4K3A2A






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Best budget graphics cards	1	2	3	4	5
	Sapphire Radeon R7 250X	MSI R7 260X OC	EVGA GeForce GTX 750	Asus GeForce GT 740 OC	MSI GeForce GT 730
Price	£65 inc VAT	£91 inc VAT	£90 inc VAT	£65 inc VAT	£48 inc VAT
Website	Sapphiretech.com	Uk.msi.com	Eu.evga.com	Asus.com/uk	Uk.msi.com
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Graphics processor	AMD Radeon R7 250X	AMD Radeon R7 260X	nVidia GeForce GTX 750	nVidia GeForce GT 740	nVidia GeForce GT730
Installed RAM	1GB GDDR5	2GB GDDR5	1GB GDDR5	1GB GDDR5	2GB GDDR3
Memory interface	128-bit	128-bit	128-bit	128-bit	128-bit
Core clock	950MHz	1175MHz	1294MHz	1033MHz	780MHz
Memory clock/Effective	1125/4500MHz	1625MHz/6.5GHz	1253/5012MHz	1.25/5GHz	900/1800MHzHz
Stream processors	640	896	512	384	320
Texture units	40	56	32	32	20
Power connectors	1x 6-pin	1x 6-pin	None	1x 6-pin	1x 6-pin
DirectX	12	11.1	Unknown	Unknown	Unknown
Digital interface	1x DVI, HDMI, DisplayPort	2x DVI, HDMI, Mini-DP	1x DVI, HDMI, DisplayPort	1x DVI, HDMI, VGA	1x DVI, HDMI, VGA
Warranty	2 years	3 years	3 years	3 years	2 years
FULL REVIEW	TINYURL.COM/OLJ83SQ	TINYURL.COM/OZ6WUYT	TINYURL.COM/PB3F6EN	TINYURL.COM/PAH5VMJ	TINYURL.COM/P8J4C2R

Best graphics cards	1	2	3	4	5
	Asus GeForce GTX 980 Ti	Zotac GeForce GTX 980 Ti	MSI GTX 980 Gaming 4G	Club3D Radeon R9 390	XFX Radeon R9 390X
Price	£639 inc VAT	£532 inc VAT	£404 inc VAT	£288 inc VAT	£309 inc VAT
Website	Asus.com/uk	Zotac.com	Uk.msi.com	Club-3d.com	Xfxfore.com/en-gb
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Graphics processor	nVidia GeForce GTX 980 Ti	nVidia GeForce GTX 980 Ti	nVidia GeForce GTX 980	AMD Radeon R9 390	AMD Radeon R9 390X
Installed RAM	12GB	12GB	4GB	8GB	8GB
Memory interface	384-bit	512-bit	256-bit	512-bit	512-bit
Core clock/boost	1216/1317MHz	1105/1140MHz	1216/1317MHz	1010MHz	1050MHz
Memory clock	7200MHz	7010MHz	7010MHz	6000MHz	6000MHz
Stream processors	2816	2816	2048	2560	2816
Texture units	172	172	128	160	176
Power connectors	2x 8-pin	1x 8-pin, 1x 6-pin	2x 8-pin	1x 8-pin, 1x 6-pin	1x 8-pin, x 6-pin
DirectX	12	12	12	12	12
Digital interface	DVI, HDMI 2.0, 3x DisplayPort 1.2	DVI, HDMI, 3x Mini-DisplayPort	DVI, HDMI, 3x DisplayPort	2x DVI, HDMI, DisplayPort 1.2	2x DVI, HDMI, DisplayPort 1.2
Warranty	3 years	5 years	3 years	2 years	3 years
FULL REVIEW	TINYURL.COM/NDZZQKJ	TINYURL.COM/POYHNUH	TINYURL.COM/Q50PK9S	TINYURL.COM/PC5PGWM	TINYURL.COM/Q8Q2GVS






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Best budget flat-panel displays					
	1 PC ADVISOR BEST BUY	2 PC ADVISOR RECOMMENDED	3 PC ADVISOR RECOMMENDED	4 PC ADVISOR RECOMMENDED	5 PC ADVISOR RECOMMENDED
	AOC i2369Vm	Philips 234E5QHAW	NEC MultiSync E243WMI	BenQ EW2740L	BenQ GL2450
Price	£130 inc VAT	£130 inc VAT	£194 inc VAT	£175 inc VAT	£108 inc VAT
Website	Aoc-europe.com/en	Philips.co.uk	Nec-display-solutions.com	Benq.co.uk	Benq.co.uk
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Screen size	23in	23in	23.8in	27in	24in
Panel type	IPS matt	IPS matt	IPS matt	VA semi-matt	TN matt
Native resolution	1920x1080	1920x1080	1920x1080	1920x1080	1920x1080
Pixel density	96ppi	96ppi	93ppi	82ppi	92ppi
Brightness	220cd/m ²	187cd/m ²	250cd/m ²	300cd/m ²	261cd/m ²
Static contrast ratio	630:1	210:1	650:1	280:1	610:1
Response time	6ms	5ms	6ms	4ms	5ms
Ports	HDMI, HDMI/MHL, DP, VGA	2x HDMI (QHAB) or 1x HDMI (QDAB), VGA	DP, DVI-D, VGA	2x HDMI, VGA	DVI-D, VGA
Dimensions	531x204x398mm	532x213x414mm	558x214x380-490mm	623x191x451mm	579x179x436mm
Weight	3.75kg	3.5kg	6.3kg	4.2kg	4.1kg
Warranty	3 years	2 years	3 years	2 years	2 years
FULL REVIEW	TINYURL.COM/OOEFYPR	TINYURL.COM/KLYLW4V	TINYURL.COM/KNCGVOU	TINYURL.COM/OO6EC5L	TINYURL.COM/OOUPFUE






Best 4K flat-panel displays					
	1 PC ADVISOR BEST BUY	2 PC ADVISOR BEST BUY	3 PC ADVISOR RECOMMENDED	4 PC ADVISOR RECOMMENDED	5 PC ADVISOR RECOMMENDED
	Panasonic TX-50CX802B	Samsung UE48JU7000	Sony KD-55X8505C	Philips 40PUT6400	Finlux 55UX3EC320S
Price	£1,299 inc VAT	£1,200 inc VAT	£1,200 inc VAT	£449 inc VAT	£799 inc VAT
Website	Panasonic.co.uk	Samsung.com/uk	Sony.co.uk	Philips.co.uk	Finlux.co.uk
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Screen size	50in	48in	55in	40in	55in
Panel type	LCD (LED)	LCD (LED)	LCD (LED)	LCD (LED)	LCD (LED)
Native resolution	3840x2160	3840x2160	3840x2160	3840x2160	3840x2160
3D enabled	✓	✓	✓	✗	✗
Apps	BBC iPlayer, ITV Player, All 4, Demand 5, Netflix, YouTube, Amazon	BBC iPlayer, ITV Player, All 4, Netflix, Amazon, YouTube and apps store	YouView with BBC iPlayer, ITV Player, All 4 and Demand 5; Netflix, YouTube, Amazon	BBC iPlayer, Netflix, YouTube, Spotify Connect, Daily Motion, Philips App Store, Google Play	BBC iPlayer, Netflix, YouTube, Twitter, Facebook, Viewster, Flickr
Networking	Ethernet, Wi-Fi, Wi-Fi Direct	Ethernet, Wi-Fi, Wi-Fi Direct	Ethernet, Wi-Fi, Wi-Fi Direct	Ethernet, Wi-Fi, Wi-Fi Direct	Ethernet, Wi-Fi
Inputs	3x HDMI, 3x USB	4x HDMI, 3x USB	4x HDMI, 3x USB	4x HDMI, 3x USB	4x HDMI, 3x USB
Dimensions	112.1x4.6x65.2cm	108.7x6.7x63cm	123.6x6x72.2cm	90.4x8.3x52.6cm	123.3x10.6x71.3cm
Weight	18kg	11.1kg	19.9kg	7.8kg	17.2kg
Warranty	1 year	1 year	1 year	1 year	1 year
FULL REVIEW	TINYURL.COM/ZLFQ3JV	TINYURL.COM/Q2W3VZY	TINYURL.COM/ZGSP9FM	TINYURL.COM/JQVWCFU	TINYURL.COM/P934VXT

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Best e-book readers






	 1	 2	 3 PC ADVISOR RECOMMENDED	 4	 5
	Amazon Kindle Voyage	Amazon Kindle (7th gen)	Amazon Kindle Paperwhite	Nook GlowLight	Kobo Aura H2O
Price	£169 inc VAT	£59 inc VAT	£109 inc VAT	£89 inc VAT	£139 inc VAT
Website	Amazon.co.uk	Amazon.co.uk	Amazon.co.uk	Nook.com/gb	Kobo.com
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Screen size	6in touchscreen	6in touchscreen	6in touchscreen	6in touchscreen	6.8in touchscreen
Screen technology	E Ink	E Ink	E Ink	E Ink	E Ink
Screen resolution	1440x1080	600x800	768x1024	758x1024	1430x1080
Built-in light	Yes	No	Yes	Yes	Yes
Storage	4GB	4GB	2GB	4GB	4GB, microSD up to 32GB
Book store	Amazon Kindle	Amazon Kindle	Amazon Kindle	Nook	Kobo
Cellular connectivity	Optional extra	No	Optional extra	No	No
Battery life	Six weeks	Four weeks	Eight weeks	Eight weeks	Two months
Dimensions	162x115x7.6mm	169x119x10.2mm	117x169x9.1mm	127x166x10.7mm	179x129x9.7mm
Weight	180g	191g	206g	175g	233g
Warranty	1 year	1 year	1 year	1 year	1 year
FULL REVIEW	TINYURL.COM/NXAAU3Q	TINYURL.COM/NSFORJE	TINYURL.COM/PREZPRK	TINYURL.COM/OZ5WMPQ	TINYURL.COM/MJVR4M9

Best media streamers






	 1 PC ADVISOR RECOMMENDED	 2 PC ADVISOR RECOMMENDED	 3	 4	 5 PC ADVISOR RECOMMENDED
	Roku Streaming Stick	Roku 3	Google Chromecast 2	Amazon Fire TV Stick	Google Chromecast
Price	£49 inc VAT	£99 inc VAT	£30 inc VAT	£35 inc VAT	£30 inc VAT
Website	Roku.com	Roku.com	Play.google.com	Apple.com/uk	Play.google.com
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Type	Dongle	Set-top box	Dongle	Dongle	Dongle
Ports	HDMI, Micro-USB	HDMI, USB, ethernet	HDMI, Micro-USB	HDMI, Micro-USB	HDMI, Micro-USB
Processor	600MHz single-core	900MHz single-core	13.5GHz dual-core	Dual-core	Single-core
RAM	512MB	512MB	512MB	1GB	512MB
Graphics	Not specified	Not specified	Not specified	Not specified	Not specified
Storage	None	512MB, plus microSD slot	None	8GB (not user-accessible)	None
Voice search	No	Yes	No	No	No
Remote control	Yes	Yes	No	Yes	No
Dimensions	78.7x27.9x12.7mm	89x89x25mm	52x52x13.5mm	84.9x25x11.5mm	72x35x12mm
Weight	18g	170g	39g	25g	34g
Warranty	1 year	1 year	1 year	1 year	1 year
FULL REVIEW	TINYURL.COM/OAP9QF9	TINYURL.COM/PT7MGUL	TINYURL.COM/Q4B6B29	TINYURL.COM/NAQRNOC	TINYURL.COM/QB6TCS2






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Best games consoles	1	2	3	4	5
					
	Sony PlayStation 4	Microsoft Xbox One	Nintendo Wii U Premium	Sony PlayStation 3 Super Slim	Microsoft Xbox 360
Price	£349 inc VAT	£349 inc VAT	£249 inc VAT	£249 inc VAT	£199 inc VAT
Website	Playstation.com	Xbox.com	Nintendo.co.uk	Playstation .com	Xbox.com
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Processor	Octa-core AMD x86	1.75GHz octa-core AMD x86	IBM Power multicore CPU	IBM CPU	IBM Xenon CPU
Graphics	1.84TFlops AMD Radeon GPU	1.31TFlops AMD Radeon GPU	AMD Radeon GPU	256MB nVidia RSX	512MB ATI Xenos
RAM	8GB GDDR5	8GB DDR3	Not specified	Not specified	512MB GDDR3
Storage	500GB	500GB	32GB, plus SD card support	500GB	500GB
Optical drive	Blu-ray, DVD, game discs	Blu-ray, DVD, game discs	Wii U, Wii discs only	Blu-ray, DVD, game discs	DVD, game discs
Ports	2x USB 3.0, AUX, HDMI	USB 3.0, HDMI	4x USB 2.0, HDMI	2x USB 2.0, HDMI	5x USB, HDMI
Connectivity	Ethernet, 802.11b/g/n, Bluetooth	Ethernet, 802.11b/g/n	802.11b/g/n	Ethernet, 802.11b/g/n, Bluetooth	Ethernet, 802.11b/g/n
Other	1 controller	1 controller, 4K, Kinect option	1 controller	1 controller	1 controller
Dimensions	275x53x305mm	333x274x79mm	46x269x171mm	290x230x60mm	269x75x264mm
Weight	2.8kg	3.2kg	1.6kg	2.1kg	2.9kg
Warranty	1 year	1 year	1 year	1 year	1 year
FULL REVIEW	TINYURL.COM/NBFLQK2	TINYURL.COM/M6J4KHS	TINYURL.COM/6J49LHL	TINYURL.COM/QDJP560	TINYURL.COM/PFP9CCK




Best budget portable speakers	1	2	3	4	5
					
	Denon Envaya Mini	UE Roll	Marsboy 5W Orb	Lumsing B9	i-box Twist
Price	£99 inc VAT	£99 inc VAT	£38 inc VAT	£23 inc VAT	£41 inc VAT
Website	Denon.com	Ultimateears.com	Amazon.co.uk	Lumsing.com	Iboxstyle.com
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Speaker(s)	Not specified	Not specified	Not specified	Not specified	2x 3W
Bluetooth	Bluetooth 4.0	Bluetooth	Bluetooth 4.1 + EDR	Bluetooth 3.0 + EDR	Bluetooth 2.1
Handsfree calls	Yes	No	No	Yes	Yes
NFC	Yes	Yes	No	Yes	No
Frequency response	Not specified	108Hz to 20kHz	80Hz to 18kHz	20Hz to 20kHz	Not specified
Impedance	Not specified	Not specified	4 ohms	4 ohms	Not specified
Extra features	IPX4 splashproof	IPX7 splashproof	MicroSD slot	MicroSD slot, lanyard	None
Claimed battery life	10 hours	9 hours	12 hours	25 hours	5 hours
Dimensions	209x54x51mmmm	134x39x40mm	150x148x138mm	177x50x70mm	246x59x56mm
Weight	558g	330g	454g	300g	380g
Warranty	1 year	2 years	1 year	1 year	5 years
FULL REVIEW	TINYURL.COM/QDRNP3P	TINYURL.COM/O7T7ZUU	TINYURL.COM/JJLOPCD	TINYURL.COM/P623MK8	TINYURL.COM/LET9RDF


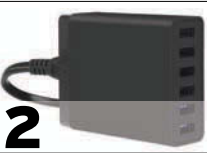




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Best budget headphones					
	1 PC ADVISOR RECOMMENDED	2 PC ADVISOR RECOMMENDED	3 PC ADVISOR RECOMMENDED	4 PC ADVISOR RECOMMENDED	5
	Rock Jaw Alpha Genus	RHA MA450i	Sennheiser HD 429	AKG K77	SoundPEATs A1
Price	£41 inc VAT	£39 inc VAT	£45 inc VAT	£25 inc VAT	£25 inc VAT
Website	Rockjawaudio.com	Rha-audio.com/uk	En-uk.sennheiser.com	Uk.akg.com	Amazon.co.uk
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Type	In-ear	In-ear	Circumaural over-ear	Circumaural over-ear	Circumaural over-ear
Frequency response	20Hz to 20kHz	16Hz to 22kHz	18Hz to 22kHz	18Hz to 20.5kHz	20Hz to 20kHz
Nominal impedance	16 ohms	16 ohms	32 ohms	32 ohms	Not specified
Sensitivity	108dB	103dB	110dB	112dB	Not specified
In-line remote	No	Yes (3 button)	No	No	No
Mic	No	Yes	No	No	Yes
Extra grommets	Yes, and filters	Yes	N/A	N/A	N/A
Carry case	Yes	Yes	No	No	No
Cable length	1.2m	1.5m (braided)	3m	2.5m	Not specified
Weight	11g	14g	218g	190g	210g
Warranty	1 year	1 year	1 year	1 year	1 year
FULL REVIEW	TINYURL.COM/NNYUFBF	TINYURL.COM/P7W7RVL	TINYURL.COM/ND8TD80	TINYURL.COM/PA8FOX4	TINYURL.COM/NKFLHKL

Best headphones					
	1 PC ADVISOR BEST BUY	2	3 PC ADVISOR RECOMMENDED	4	5
	Denon AH-D600	Audio-Technica ATH-WS99	Bose QuietComfort 20	Denon AH-W150	Bowers & Wilkins P5
Price	£229 inc VAT	£79 inc VAT	£259 inc VAT	£59 inc VAT	£249 inc VAT
Website	Denon.co.uk	Eu.audio-technica.com/en	Bose.co.uk	Denon.co.uk	Bowers-wilkins.co.uk
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Type	Circumaural over-ear	Over-ear	In-ear	Over-ear wireless buds	On-ear, foldable
Frequency response	8Hz to 25kHz	8Hz to 25kHz	20-21kHz	5Hz to 25kHz	10Hz to 20kHz
Nominal impedance	37 ohms	37 ohms	32 ohms	16 ohms	22 ohms
Sensitivity	120dB	120dB	105dB	102dB	108dB
In-line remote	Yes	Yes	Yes	Yes	No
Mic	No	Yes	Yes	Yes	Yes
Extra grommets	N/A	N/A	Yes	Yes	N/A
Carry case	Yes	No	Yes	Yes	No
Cable length	3m	0.8m	1.3m	N/A	1.2m
Weight	250g	250g	44g	23g	195g
Warranty	1 year	1 year	1 year	1 year	1 year
FULL REVIEW	TINYURL.COM/NBCFJW6	TINYURL.COM/QDRCCAT	TINYURL.COM/OEAGFOF	TINYURL.COM/O2CJV3R	TINYURL.COM/NNRV6UT

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Best power banks					
	1 	2 	3	4	5
	Zendure A2 (2nd gen)	Xiaomi 10,000mAh	Anker PowerCore+ 20100	Maximas XTRON USB-C	iHarbot Power Bank MS024
Price	£25 inc VAT	£11 inc VAT	£32	\$69 (£45)	£7.50 inc VAT
Website	Zendure.com	Mi.com/en	Anker.com	Indiegogo.com	Amazon.co.uk
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Capacity	6700mAh	10,000mAh	20,100mAh	13,400mAh	5000mAh
Input	1x 7.5W Micro-USB	1x 10W Micro-USB	1x 15W USB-C	1x 10W Micro-USB	1x 10.5W Micro-USB
Outputs	1x 10.5W USB	1x 10.5W USB	2x 12W USB	1x 21W USB	1x 10W USB
Auto-on/-off	Yes	Yes	Yes	No	Auto-on
Passthrough charging	Yes	Yes	No	No	Yes
Status indicator	4 LEDs	4 LEDs	4 LEDs	4 LEDs	4 LEDs
LED flashlight	No	No	No	No	No
Carry case	Yes	No	Yes	No	No
Dimensions	93x48x23mm	91x60.4x22mm	184x62x24mm	77x21x93mm	118x11.6x63mm
Weight	137g	207g	155g	247g	150g
Warranty	1 year	1 year	18 months	Not specified	18 months
FULL REVIEW	TINYURL.COM/NGCNO5F	TINYURL.COM/NFQZOCB	TINYURL.COM/ZEZURYP	TINYURL.COM/PVO2LEC	TINYURL.COM/PVO2LEC

Best desktop chargers					
	1	2	3	4 	5
	Tronsmart Titan	CHOETech 6-port Charger	Aukey USB Charging Station	iClever USB Travel Charger	Lumsing Desktop Charger
Price	£25 inc VAT	£25 inc VAT	£17 inc VAT	£20 inc VAT	£13 inc VAT
Website	Tronsmart.com	Choetech.com	Hisgadget.com	Hisgadget.com	Lumsing.com
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Max output	90W	60W	54W	50W	50W
Outputs:					
USB 1	18W USB	15W USB	9W USB	12W USB	8W USB
USB 2	18W USB	15W USB	9W USB	12W USB	8W USB
USB 3	18W USB	15W USB	9W USB	12W USB	8W USB
USB 4	18W USB	15W USB	9W USB	12W USB	8W USB
USB 5	18W USB	12W USB	18W USB	12W USB	8W USB
USB 6	N/A	15W USB	N/A	12W USB	N/A
Colours available	Black	Black	Black	Black	Black
Dimensions	160x81x28mm	71.5x29x88.4mm	94x60x25mm	100x69x27mm	92x58x28mm
Weight	292g	158g	149g	180g	146g
Warranty	1 year	1 year	1 year	1 year	1 year
FULL REVIEW	TINYURL.COM/GMVDCHM	TINYURL.COM/QG4X5D9	TINYURL.COM/P2CZMCU	TINYURL.COM/MPA4DWC	TINYURL.COM/Z2VV3MQ

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STEVEN J
VAUGHAN-
NICHOLS



Dying technologies of 2016

To every thing there is a season, and a time to every purpose under the heaven: A time to be born, and a time to die.

Ecclesiastes 3:1

For many technologies, the time to die will be 2016. That doesn't mean there won't be people still using the deceased technologies. But these dying technologies are so far gone they're not going to matter to most users and companies. For example, while Windows XP is still used by a handful of businesses and by 11 percent of users, according to NetMarketShare's count, no one thinks of XP except as a slowly dying, zombie operating system. And, considering how insecure Windows XP is these days, many of those XP PCs probably really are malware zombies.

So what's going to the chopping block in 2016?

Well, a lot of once-popular gadgets are on their way out. Remember when digital music players were all the rage? All that's really left of that is Apple's iPod. The iPod has been declining for a while now. Some people hoped that Apple Music could relaunch the iPod, but that's not happening. The future of music in your pocket belongs to smartphones.

Speaking of smartphones, I don't see BlackBerry staying alive for another year. The latest model, the BlackBerry Priv, hasn't found much love. It was fun for a while, BlackBerry, but you can stop thrashing now. It's time to lie quietly in your grave.

I wonder too just how long Microsoft will pour money down the Windows Phone rat hole? I mean, the company wrote off its entire smartphone investment in Nokia in July 2015. NetMarketShare has the Windows Phone OS with a lousy 3.4 percent of the mobile market. This is a dead operating system walking.

Still, Windows Phone is doing better than landline phones. These once universal gadgets still have a minute presence, but every year that goes by, fewer people I know use one. The bottom line is everyone uses a mobile phone, so who wants to spend money on an additional phone that can't go in your pocket? Only grandpa and grandma, and even they're getting the clue.

Thinking of antique technologies, vinyl has made a comeback but CDs, DVDs and Blu-ray? They're all marching to the media graveyard. Today, we stream everything we can. I still buy and own CD and DVD players, but I'm an old guy. Also, call me a Luddite, but I like having my music, videos and books in my hand, not in some distant cloud. There aren't many of us left. Fewer and fewer PCs

and laptops come with a CD/DVD player.

We used to use CD/DVD drives to install software too. I rarely do that anymore. That's not just because we download almost all our software today. It's also because stand-alone PC software is on its way out. Accounting, office suites, customer-relationship management – you name it, we do it on the cloud now.

Thus, it's no surprise that PCs continue on their way out the door. PC sales continue to decline. IDC has announced that 2015 PC shipments declined by 10.3 percent year-over-year from 2014. They still sell in the hundreds of million, so they aren't going to be disappearing from our offices soon, but by 2020 it will be a different story.

I grew up with much of this technology. I will still be using a lot of it in 2020, but I doubt the rest of you will have PCs, DVD players and standalone software programs. The writing is on the wall for many of these technologies, and that writing is an obituary. ☒

“ PC sales continue to decline. IDC has announced that 2015 PC shipments declined by 10.3 percent year-over-year from 2014 ”



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